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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

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0.32 (1.85) CRUSTACEAN COLOR-CHANGE HORMONE: AMINO ACID SEQUENCE AND CHEMICAL SYNTHESIS

Fernlund, Per (Division of Physiological Chemistry, Chemical Center, University of Lund, S-220 07 Lund 7, Sweden), and Lars Josefsson (Department of Biochemistry C, University of Copenhagen, D-2200 Copenhagen N, Denmark)
Science 177, No. 4044, 173-175 (July 14, 1972)

Many crustaceans have the ability to change their body color, and colorchanges are produced by specialized hypodermal cells containing movable pigment granules. The cells are controlled through hormones secreted from nerve endings in the sinus gland, a neurohemal organ located in the eye stalks of most decapod crustaceans.

One color-change hormone, the blanching (red-pigment-concentrating) hormone, was isolated from the eyestalks of the prawn Pandalus borealis, and analyzed for composition and structure.

Quantitative amino-acid analysis of 8 µg. of hormone after hot, acid hydrolysis plus ultraviolet spectroscopy gave the following composition accounting for 89% of the initial weight: Asp, Glu, Gly, Leu, Phe, Pro, Ser, and Trp. The hormone was found to have a blocked NH_2-terminus and to be electrophoretically immobile at all pHs, proving that it has no free carboxyl groups.

Digestion of the hormone with thermolysin, and fractionation of the digest on a column of Sephadex G-25, with further analysis, gave two major peptide fragments: one NH_2-terminal, the blocked tripeptide (Asx, Gly, and Leu), and one COOH-terminal, the pentapeptide Phe-Ser-Pro-Gly-Trp-NH_2. The sequence of the NH_2-terminal part was determined by mass spectrometry to be pGlu-Leu-Asn-Phe-Ser-Pro-Gly-Trp-NH_2.

(over)

0.321 DETERMINATION OF PROTEIN: A MODIFICATION OF THE LOWRY METHOD THAT GIVES A LINEAR PHOTOMETRIC RESPONSE

Hartree, E. F. (Agricultural Research Council, Unit of Reproductive Physiology and Biochemistry, 307 Huntington Road, Cambridge CB3 OJQ, England)
Analytical Biochemistry 48, No. 2, 422-427 (Aug. 1972)

A linear relationship between concentration of a soluble protein and photometric response was provided by a modification of the Lowry procedure for the assay of protein concentration [O. H. Lowry, N. J. Rosebrough, A. L. Farr, and R. J. Randall, J. Biol. Chem. 193, 265 (1951); and G. L. Miller, Anal. Chem. 31, 964 (1959)].

Assays were carried out in medium weight, 13 mm. diameter test tubes matched for wall thickness. Protein samples were diluted to 1 ml. with water and treated with 0.9 ml. solution A (2 g. potassium sodium tartrate, 100 g. Na_2CO_3 dissolved in 500 ml. 1 N NaOH, and diluted to 1 liter with water). A blank and a standard were set up similarly. The tubes were placed in a water bath at 50° for 10 min., cooled to room temperature (21°-25°), and treated with 0.1 ml. solution B (2 g. potassium sodium tartrate, 1 g. $CuSO_4 \cdot 5H_2O$ dissolved in 90 ml. water, containing 10 ml. 1 N NaOH). The solutions were left at room temperature for at least 10 min., then 3 ml. solution C was forced in rapidly to ensure mixing within 1 sec. (Solution C--1 vol. Folin-Ciocalteu reagent diluted with 15 vol. water. This solution--prepared daily--should be between 0.15 N and 0.18 N when titrated to pH 10 with 1 N NaOH.) The tubes were again placed in the 50° water bath for 10 min. and cooled to room temperature. Absorbancy was read in 1 cm. cuvets at 650 nm.

Within the range of 15-110 µg. protein, there was direct proportionality between weight of protein and readings at A_{650}; experimental points for standard protein solutions showed deviations in absorbance of 3% max. from the best straight

 (over)

0.34 FLUORESCENT THIOL REAGENTS. V. MICROFLUOROMETRY OF THIOL COMPOUNDS WITH A FLUORESCENT-LABELED MALEIMIDE

Sekine, Takamitsu, Kimiyo Ando (School of Medicine, Juntendo University, Hongo, Tokyo, Japan), Minoru Machida, and Yuichi Kanaoka (Faculty of Pharmaceutical Sciences, Hokkaido University, Sapporo, Japan)
Analytical Biochemistry 48, No. 2, 557-568 (Aug. 1972)

The thiol group in biochemical substances is necessary in critical events of biological processes [such as immunization, blood clotting, and detoxication]. Thiol-containing substances of biological interest include proteins and low molecular compounds such as cysteine, reduced glutathione, ergothionine, and some coenzymes.

The available methods of assay for thiol compounds require a sample of at least several milliliters. The sample also requires the presence of about 10^{-5} M of a thiol compound. Such amounts are not always available; thus, there is a need for a more sensitive method of analysis.

To meet this need, a new method for the quantitative determination of thiol compounds was developed and is based upon the fluorescence characteristics of the reagent N-(p-(2-benzimidazolyl)phenyl)maleimide (BIPM). BIPM adducts to thiol compounds have strong fluorescence; the reagent itself has no appreciable fluorescence. Observations of the method indicated that the addition reaction of 2×10^{-6} M BIPM to thiols was complete within 30 min. at pH 6.85 and a temperature of 0° C. A linear relation was observed, up to 10^{-5} M of the reagent, between concentration of adduct and intensity of fluorescence.

(over)

0.35 (7.599)(8.59) ESTIMATION OF STEAM-VOLATILE N-NITROSAMINES IN FOODS AT THE 1 µG/KG LEVEL

Crosby, N. T., J. K. Foreman, J. F. Palframan, and R. Sawyer (Laboratory of the Government Chemist, DTI, Cornwall House, Stamford St., London SE1 9NQ, England)
Nature 238, No. 5363, 342-343 (Aug. 11, 1972)

The carcinogenic and hepatotoxic properties of N-nitrosodimethylamine have been reported in other work. The authors suggest that any potential nitrosamine hazard through use of nitrates and nitrites in preserving and processing foodstuffs should be evaluated. The assessment of a possible hazard should include the combination of the necessary precursors and conditions under which nitrosamine formation can occur.

Nitrates are widely distributed in nature and can readily be reduced to nitrites by bacteria. The principal chemical route to N-nitrosamine formation is the reaction of secondary amines [amines containing the imino group :NH] with nitrous acid in the presence of nitrite ion. The authors state that there is little information on the occurrence of secondary amines in foods.

Sensitive and specific analytical methods for identification and estimation of N-nitroso compounds in food products are essential for evaluation of any health hazard due to N-nitrosamine formation. The authors have investigated various methods of separation of volatile N-nitrosamines. They used two types of nitrogen selective detector for preliminary examination of food extracts. Where a positive response was obtained, the extract was further examined by the combined gas-liquid chromatography and mass spectrometry technique of molecular ion monitoring using a high resolution instrument.

(over)

0.321

line fit. The sensitivity of the method can be increased by using 2-cm. cuvets or by scaling down reagent columns. Results are less reproducible at protein levels below 15 μg.
[1 figure, 2 tables, 6 references]

SW

FLF

[sauger, 32 species; and sperm whale--valine.
[4 figures, 5 tables, 32 references]

horse--glycine; and sperm whale--valine.

identification: salmon shark--glycine; tuna--phenylalanine; turtle--threonine; and sperm whale--valine.

The hormone was compared with a peptide synthesized from amino acids, and containing the same amino-acid sequence as the hormone. No differences were observed in thin-layer chromatography, or in adsorption chromatography on Sephadex G-25. The mass spectrum of the synthetic peptide differed from the hormone only in numbers of peaks at certain m/e values. In addition, the synthetic peptide caused blanching of the prawn P. borealis and the shrimp Palaemon adspersus.

The results of these comparisons and analyses, the authors concluded, indicated the correct structure and composition of the hormone.
[1 figure, 1 table, 20 references]

SW

0.35 (7.599)(8.59)

The sample was minced and steam distilled and redistilled, then extracted with methylene chloride. The organic layers were combined, dried, and evaporated at 50° C. until 2.5 ml. solvent remained. The concentrated extract was examined by gas chromatography and the results were confirmed by mass spectrometry.

The foods likely to contain the essential precursors for nitrosamine formation were studied. These foods included cured and processed meats such as bacon, ham, and salami; cured and fresh fish; and cheeses in which the use of nitrate or nitrite is permitted.

Using their method the authors reported the presence of volatile nitrosamines in quantities down to 1 μg./kg. Interference from other nitrogenous compounds occurred in samples of some cooked foods which made quantitatively measurements of the lower molecular weight species difficult.

A mixture of nitrosamines was added to raw and cooked food samples for recovery trials. Overall recoveries fell in the range of 70 to 90% except for N-nitrosopyrrolidine which fell below 30%.
[3 tables, 19 references]

MS

0.34

This fluorometric determination of thiol compounds is very sensitive. The detection limit was 10^{-6} M concentration of thiols, with 0.1 ml. of sample, corresponding to 0.03 μg. reduced glutathione, with an accuracy of 3%. The reliability of this method was compared to the colorimetric determination using 5,5'-dithiobis-(2-nitrobenzoic acid) (DTNB). The data demonstrate agreement between the results obtained by both methods. The amount of thiol compound was only one-hundredth of that required for colorimetric assay. The standard deviation of both methods was about the same, with corresponding mean value of about 3%.
[6 figures, 3 tables, 23 references]

SN

0.31 COMPONENT FATTY ACIDS OF SOME MARINE ALGAL LIPIDS

Jamieson, G. R., and E. H. Reid (Chem. Dep. Paisley Coll. Technol. Paisley/Renfrewshire, Scotland)
Chemical Abstracts 76, No. 23, 137830j (June 5, 1972)

0.34 (9.19) EXTRACTION AND RECOVERY OF POLYCHLORINATED BIPHENYLS (PCB) USING FOROUS POLYURETHANE FOAM

Gesser, H. D., A. Chow, F. G. Davis, J. F. Uthe, and J. Reinke (Chem. Dep., Univ. Manitoba, Winnipeg, Manitoba, Canada)
Chemical Abstracts 76, No. 19, 109008d (May 8, 1972)

0.35 SODIUM AND POTASSIUM IN THE EDIBLE PORTIONS OF THIRTY FISH SPECIES

Badawi, H. K. (Inst. Oceanogr. Fish., Alexandria, U.A.R.)
Chemical Abstracts 76, No. 23, 139206j (June 5, 1972)

0.32 COMPARATIVE STUDIES ON MYOGLOBINS. I. SPECTRAL PROPERTIES AND AMINO ACID COMPOSITIONS OF MYOGLOBINS FROM SHARK, BONY FISHES, TURTLE AND MAMMALIA

Tomita, Hiroshi, and Yasuhiko Tsuchiya (Dept. of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 22, No. 4, 228-238 (Dec. 1971)

As part of an overall study of the myoglobins, the authors report on the preparation and characteristics of the myoglobins from the dark muscle of salmon shark, mackerel, skipjack tuna, and bigeye tuna, and from the ordinary muscle of turtle, sperm whale, and horse. The myoglobins from these sources contained from 0.304 to 0.324% of Fe on the dry basis, with molecular weights of about 18,000. There was little difference in the infrared spectral nature of the protein moieties of the myoglobins of the seven animal species; however, significant differences existed in the amino-acid compositions. One mole of half cystine occurs per molecule of the myoglobins of salmon shark, mackerel, skipjack tuna, and bigeye tuna, but no cystine occurs in the myoglobins of turtle, sperm whale, and horse. The terminal amino-acid residue in the myoglobin of the following species was identified: salmon shark--glycine; tuna--phenylalanine; turtle--threonine; and sperm whale--valine.

0.32 (1.85) (

0.35 (0.38) AMINO-ACID SEQUENCE HOMOLOGY IN THE MUSCLE ALDOLASES FROM STURGEONS OF DIFFERENT SPECIES

Gibbons, Ian, Richard N. Perham (Department of Biochemistry, University of Cambridge, Tennis Court Road, Cambridge CB2 1QW, England), and Peter J. Anderson (Department of Biochemistry, Faculty of Medicine, University of Ottawa, Ottawa 2, Quebec, Canada)
Nature New Biology 238, No. 84, 173-174 (Aug. 9, 1972) (MacMillan Journals Limited, 4 Little Essex St., London WC2R 3LF, England)

The nature and number of amino-acid replacements between homologous proteins can provide information about the functional role of individual residues and about evolution. The amino-acid sequence of the enzyme fructose 1,6-diphosphate aldolase isolated from ox, pig, and rabbit muscle has been highly conserved throughout mammalian evolution. Comparison of the primary structure of the enzyme of the muscle from these mammals with that of a North Sea sturgeon indicated that the proteins were homologous, but a number of amino-acid replacements had occurred.

A peptide containing the active-site-lysine residue and an 18 residue peptide ajoining it in the primary structure were isolated from aldolases obtained from the muscle of four species of sturgeon (Acipenser), and their amino-acid sequences were determined.

The peptides were obtained by S-carboxymethylating the pure aldolases in 8 M urea and then splitting them with cyanogen bromide. The peptide not containing the active-site-lysine was a straightforward cleavage product with cyanogen bromide. The peptide containing the active-site-lysine was produced by tryptic digestion of the purified cyanogen bromide-treated fragment of the protein.

(over)

0.35 SYNTHETIC SCOTOPHOBIN IN GOLDFISH: SPECIFICITY AND EFFECT ON LEARNING

Bryant, Rodney C., Nelson N. Santos, and William L. Byrne (Brain Research Institute and Department of Biochemistry, University of Tennessee Medical Units, Memphis, TN 38103)
Science 177, No. 4049, 635-636 (Aug. 18, 1972)

Scotophobin is formed in the brains of rats learning to avoid a darkened compartment. The molecule has now been synthesized. It does show activity in mice. The present paper reports on the effect of synthetic rat scotophobin injected intracranially into common goldfish (Carassius auratus) that were then trained to avoid light or dark. The scotophobin interacts with the learning process in goldfish in an apparently specific way. It facilitates the acquisition of dark avoidance (a task homologous with that acquired by rats from which the natural peptide was isolated) and inhibits the acquisition of light avoidance.
[2 figures, 11 references] FTP

0.35 PURIFICATION AND PROPERTIES OF PROTEASES FROM A MARINE-PSYCHROPHILIC BACTERIUM

Kato, Nobuo, Toru Nagasawa, Shoji Adachi, Yoshiki Tani, and Koichi Ogata (Dept. of Agricultural Chemistry, Kyoto University, Kyoto, Japan)
Agricultural and Biological Chemistry 36, No. 7, 1185-1192 (July 1972)

This is the second part of a series of papers on the proteases from a marine-psychrophilic bacterium. The first article was published on pages 1177-1184 of the same issue of this journal. This present article describes the various steps used in the purification of the proteases from the marine psychrophilic bacterium Pseudomonas sp. No. 548.

The protease system was fractionated by two-step chromatography using DEAE-cellulose into four components, each showing protease activity. Each protease was purified by gel filtration on Sephadex G-100 and G-75. In the first step, fraction I was eluted from the DEAE-cellulose column by 0.1 M NaCl; fraction II was eluted by 0.3 M NaCl. Each fraction subsequently yielded two proteases. Protease Ia was obtained in crystalline form; proteases Ib, IIa, and IIb were highly purified. Each of the four enzymes was inactivated by EDTA (ethylenediaminetetraacetate); proteases Ia, Ib, and IIb were inactivated by diisopropylfluorophosphate. Protease Ia showed optimum activity at pH 10.0; the other proteases at pH 7.0 to 8.0. Proteases Ia, Ib, and IIb were stabilized by calcium ion.
[9 figures, 2 tables, 12 references] FTP

0.39 ROLE OF BASE COMPOSITION IN THE ELECTROPHORESIS OF MICROBIAL AND CRAB DNA IN POLYACRYLAMIDE GELS

Zeiger, Robert S., Raphael Salomon, C. Wesley Dingman, and Andrew C. Peacock (Chemistry Branch, National Cancer Institute, National Institutes of Health, Bethesda, MD 20014)
Nature New Biology 238, No. 81, 65-69 (July 19, 1972)

[Molecules of different size and chemical composition exist in DNA; this characteristic is called heterogeneity. The molar proportions of bases (base ratio) in DNA represent a statistical average which is constant for a given species. Analyses of the base composition shows that there is a compositional diversity relative to a species and it is expressed in ranges of mole percent G+C (guanine-cytosine). There is a physicochemical method of analyzing DNA which not only determines the base ratio but also clarifies the concept of heterogeneity. The method consists in the determination of the buoyant density of DNA in a linear gradient of CsCl generated in an ultracentrifugal field. At equilibrium the DNA molecules concentrate in a region of the gradient corresponding to their buoyant density. The distribution of the molecules is Gaussian (distributed in a bell-shaped, symmetrical pattern), and the mode (the value that occurs most frequently) therefore corresponds to an equilibrium position where centrifugal and thermal forces are equal. The variance of this distribution is thus a measure of heterogeneity. It has been shown that the buoyant density corresponding to the mode is directly proportional to the G+C molar content. Abstractor's note]

(over)

0.35 (4.5) EFFECTS OF pH, CONCENTRATION AND AGING ON THE MALONALDEHYDE REACTION WITH PROTEINS

Shin, Bak C., John W. Huggins, and Kermit L. Carraway (Dept. of Biochemistry, Oklahoma State University, Stillwater, OK 74074)
Lipids 7, No. 4, 229-233 (Apr. 1972)

Malonaldehyde is one of the major products of the oxidation of lipids. It reacts readily with proteins. In order to better understand the effect of malonaldehyde on proteins, the effect of some parameters affecting the reaction were studied. In the present study, the inactivation of several enzymes (ribonuclease and papain) by malonaldehyde was examined.

Malonaldehyde reacts with the enzymes to cause inactivation, the production of fluorescence, and the cross linking of protein molecules. Each of the reactions is pH dependent with a different optimum pH level. The presence of essential sulfhydryl groups in the enzyme does not appear to be significant to the rate of inactivation. Storage tests with malonaldehyde showed that it undergoes decomposition which is dependent upon time, reagent concentration, and pH. Furthermore, the products of this decomposition are also capable of causing inactivation of enzymes and the production of fluorescence. The nature of such products is not known.

The authors state that the biological significance of these reactions is difficult to assess. Because of the number of variables involved in the reactions, it appears that there are no simple solutions to the problem of the reactions of malonaldehyde or other products of oxidized lipids with proteins.

[9 figures, 1 table, 15 references] FTP

0.39

The intramolecular heterogeneity of eukaryotic (higher order species) nuclear DNA is shown by satellite and mainband DNAs which have characteristic buoyant densities, base composition, and reassociation rates.

Experiments on crab DNA were conducted in which satellite DNA separated electrophoretically from its main band DNA. It was observed that the crab satellite DNAs migrated electrophoretically slower on gels and have lower G-C content than their respective main band DNAs.

Experiments were performed to determine the relation between electrophoretic pattern and base composition of DNA by comparing the effects of nucleotide composition and molecular weight of microbial DNA on its electrophoretic migration in composite acrylamide-agarose gels. The results showed that the mobility of DNA in the gel is dependent in part on its base (or G-C) composition. Mobility of DNA is also affected by its molecular weight.

[4 figures, 1 table, 28 references] SW

0.35 (0.38)

In all four species of sturgeon the peptides containing the active-site-lysine had identical primary structure; the other 18 residue peptides were found to be variable. In peptides from A. fulvescens and A. transmontanus position 29 is occupied by tyrosine. In the peptides of A. sturio and A. oxyrhynchus the tyrosine is replaced by asparagine. Serine occupies position 31 of the peptide from A. fulvescens, but alanine occupies this position in the other three species.

This variation in aldolase structure between species of sturgeon surprized the authors; they believe that aldolase is a highly conserved protein. They concluded that the mutations of the alteration of amino-acid sequence is a rare event. They attribute these differences to early and lasting isolation of genetic populations. Further work on the aldolases of the species studied and other sturgeons may be expected to provide information, at the molecular level, on the evolution of species in general and the sturgeon in particular.

[1 figure, 8 references] SW

0.35 (9.19) SUBTLE CONSEQUENCES OF METHYLMERCURY EXPOSURE: BEHAVIORAL DEVIATIONS IN OFFSPRING OF TREATED MOTHERS

Spyker, Joan M. (Departments of Anatomy and Pharmacology, University of Minnesota Medical School, Minneapolis, MN 55455), Sheldon B. Sparber, and Alan M. Goldberg
Science 177, No. 4049, 621-623 (Aug. 18, 1972)

The authors found that, in the absence of any overt sign, offspring from mice exposed to methylmercury behaved significantly different from controls when tested for subtle deviations during postnatal development. They suggested that subtle parameters should be examined when assessing the risks of exposure to methylmercury--it is possible that people with minor symptoms or subclinical damage have gone undetected.

[1 figure, 1 table, 15 references] FTP

0.38 LEUCINE CARBOXYLASE OF MARINE RHODOPHYCEAE. 3. COENZYME SPECIFICITY AND ACTIVATION BY CARBONYLIC COMPOUNDS

Hartmann, Thomas (Pharmakognostisches Inst., Univ. Bonn, Bonn, Germany)
Chemical Abstracts 76, No. 17, 96313x (Apr. 24, 1972)

0.33 NEW POLYVALENT PROTEASE INHIBITORS FOR TRYPSIN, CHYMOTRYPSIN, PLASMIN, AND KALLIKREINS FROM SNAILS (HELIX POMATIA)

Tschesche, Harald, Thomas Dietl, Rudolf Marx, and Hans Fritz (Org.-Chem. Lab., Tech. Univ. Muenchen, Munich, Germany)
Chemical Abstracts 76, No. 21, 123391e (May 22, 1972)

0.39 GAMMA SPECTROMETRY OF MARINE ORGANISMS FROM THE WEST COAST OF INDIA

Unni, C. K., and R. Viswanathan (Health Phys. Div., Bhabha At. Res. Cent., Bombay, India)
Chemical Abstracts 77, No. 3, 16016k (July 17, 1972)

0.39 DE NOVO SYNTHESIS OF TRANSFER AND 55 RNA[1f] IN CLEAVING SEA URCHIN EMBRYOS

O'Melia, Anne F., and Claude A. Villee (Department of Biological Chemistry, Harvard Medical School, Boston, MA 02115; and Marine Biological Laboratory, Woods Hole, MA 02543)
Nature New Biology 239, No. 89, 51-53 (Sept. 13, 1972)

Significant changes in RNA metabolism during early sea urchin development have been found. Until recently the only detectable class of RNA synthesized during cleavage stages was that with a low guanine+cytosine (G+C) base composition and heterogeneous sedimentation properties (DNA-like RNA) [under the action of a centrifugal field]. The genes for nucleolar ribosomal RNA (26S and 18S) [S = sedimentation characteristic or Svedberg unit] were believed to become active only following gastrulation [of the embryo], and the products of nuclear transfer RNA (4S) genes were first detected at the mesenchyme blastula stage.

Some concepts of RNA synthesis in cleaving sea urchin embryos are changing. The authors examined the possibility that the genes for nuclear ribosomal 5S RNA were active at this stage. Using the techniques of sucrose density gradient centrifugation, and reprecipitating RNA from the 4S region, and the sensitive refractionating by electrophoresis on polyacrylamide gels, several species of low molecular weight RNA were resolved. The authors believe this information demonstrates that the genes for ribosomal 5S and for tRNA (4S) RNAs are active in transcription [copying the genetic code] and are not repressed during cleavage stages of sea urchin embryo development.

[4 figures, 28 references] SW

0.4 MOVEMENTS OF ECHINOCHROME GRANULES DURING THE EARLY DEVELOPMENT OF SEA URCHIN EGGS

Belanger, A. M., and R. C. Rustad (Marine Biological Laboratory, Woods Hole, MA 02543, and Department of Radiology, Case Western Reserve University, Cleveland, OH 44106)
Nature New Biology 239, No. 90, 81-83 (Sept. 20, 1972)

Echinochrome (respiratory) pigment granules in unfertilized eggs of the sea urchin (Arbacia punctulata) undergo randomly directed saltatory [discontinuous-jumpy] movements. After fertilization nearly all these granules migrate to the egg cortex [the area beginning at the inner surface of the cell wall and extending inward] and become embedded. Subsequent movement of pigment granules may be due to mass cortical changes rather than independent granule movements. At the fourth cleavage, a quartet of micromeres [one of the smaller cells resulting from unequal segmentation of an egg] containing little or no pigment forms at the vegetal pole of the embryo. [The vegetal pole is the center of the protoplasm which gives rise to the hypoblast (innermost of three primary germ layers and source of the epithelium of the digestive tract and its derivatives). Abstractor's note] By the two or four cell stage, pigment granules have begun to move out of this region, leaving a "clear area" on each blastomere.

To investigate possible mechanims of these movements and their relation to cortical events involved in fertilization, cleavage, and micromere formation, eggs were treated at critical stages with agents (such as colchicine, colcemid, or cytochalasin B) expected to prevent or alter pigment granule movements.

(over)

0.4 CARCINOGENIC NITROSAMINES FORMED BY DRUG/NITRITE INTERACTIONS

Lijinsky, William (Biology Division, Oak Ridge National Laboratory, Oak Ridge, TE 37830), Evelyn Conrad, and Rosalie Van de Bogart (Eppley Institute for Cancer Research, University of Nebraska Medical Center, Omaha, NE 68105)
Nature 239, No. 5368, 165-167 (Sept. 15, 1972)

Nitrosamines have broad carcinogenic activity in many animal species. Man may be exposed to nitrosamines formed in vivo from ingested nitrite and secondary amines; nitrite and several secondary amines are common in the diet. Tertiary amines can also react with nitrite in the mildly acid condition of the mammalian stomach; therefore drugs containing or consisting of tertiary nitrogen must also be considered.

Interaction of nitrite was studied with six tertiary compounds representative of different types of chemical structure found in food or drugs: oxytetracycline (antibiotic), aminopyrine (analgesic), disulfiram (antialcoholic), nikethamide (respiratory stimulant), tolazamide (oral hypoglycaemic), and piperine (found in pepper). All gave measurable yields of nitrosamine at body temperature.

The tertiary amines aminopyrine and oxytetracycline gave high yields of dimethylnitrosamine (DMN); however, reactions with the antibiotic showed a marked dependence on pH and nitrite concentration. The optimum pH was 3, and a lower yield of DMN was obtained at lower molar ratios of nitrite.

The dialkylamides, nikethamide, and disulfiram yielded diethylnitrosamine; and piperine yielded nitrosopiperidine. Formation of nitrosamine was favored at pH above 3.

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0.5 (3.15) POST-IRRADIATION EVALUATION OF PATHOGENS AND INDICATOR BACTERIA

Tiwari, N. P., and R. B. Maxcy (Department of Food Science & Technology, University of Nebraska, Lincoln, NE 68503)
Journal of Food Science 37, No. 3, 485-487 (May-June 1972)

The purpose of this study was to determine the post-irradiation behavior of certain species of Salmonella and certain indicator organisms of public health significance.

Radurization of foods kills some bacteria and injures others. The injured cells are capable of growth in favorable environment but are not able to grow in the presence of inhibitory agents in selective media. Cells injured by radiation show sensitivity similar to cells injured by heat, freezing, or bactericidal treatment. The recovery of injured radurized cells on selective media may depend upon the nature of such media. Because the mechanism of recovery is not understood, we must evaluate the phenomena in terms of the influence of various food processing and storage operations to understand its significance in radurized foods.

The bacteria used were Salmonella typhimurium, S. enteritidis, S. heidelberg, and S. senftenberg, Escherichia coli, Streptococcus faecalis, and Staphylococcus aureus. A cobalt-60 source providing 17 Krad of gamma radiation per minute was used. Various nonselective and selective media were used appropriate to the organism examined. Infectivity of uninjured and injured cells was determined. Injured cells were considered those that were capable of growing on the most favorable growth medium (Plate Count Agar) but were not capable of growing on selective

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0.4

Tolazamide, a substituted urea and a dialkylhydrazine, was rapidly converted to N-nitrosohexamethyleneimine; this product has been reported to be a potent liver carcinogen in rats.

These reactions occurred with higher concentrations of drug and nitrite than are normally found in the human stomach; however, the yields of nitrosamine expected in the normal use of the drugs may be predicted from the course of the reactions. The amount of nitrosamine formation may be negligible with some of the drugs, but the authors suggest no exposure to a carcinogen can be considered insignificant. [3 tables, 9 references] SW

Reprinted

0.38 STUDIES ON THE RAINBOW TROUT ALDOLASE. III. ENZYMIC PROPERTIES OF THE ALDOLASE FROM RAINBOW TROUT MUSCLE

Nagahisa, Eizo, and Yasuhiko Tsuchiya (Dept. of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agricultural Research 22, No. 4, 239-247 (Dec. 1971)

This paper describes the characteristics of the aldolase from rainbow trout muscle. The enzyme is most active at about 30° C, but shows high activity at temperature just below 20° C. It is thermolabile; its activity is greatly retarded at 40° C, and completely retarded at 55° C. The activity of the enzyme is substantially inhibited by the presence of divalent metal ions.
[7 figures, 1 table, 13 references] FTP

0.5 (3.15)

medium; the difference in count between growth obtained on the two media was considered to be the count of injured cells.

When irradiated cultures of S. typhimurium were stored at 5° C. for 24 hr., fewer organisms were recovered than were indicated by counts immediately after irradiation. The rate of post-irradiation death of S. typhimurium was temperature dependent; no reduction occurred in 8 hr. at 5° C., and marked reduction occurred in 8 hr. at 37° C. The unirradiated culture (being in the stationary growth phase) showed no change. Post-irradiation death includes noninjured and injured cells. The proportion of injured cells to normal cells for the salmonellae was approximately the same with increasing irradiation dose level. S. aureus showed an increase proportion of injured cells to normal cells with increasing dose to 272 Krad; E. coli showed an increased proportion with increasing dose to 170 Krad.

The infectivity of irradiated cells, as determined by egg yolk challenge, was less than that for unirradiated cells. Although radiation resistance may be acquired through recycling, there appears to be no increase in virulence.

Although additional phenomena must be considered in the enumeration of bacterial cells in irradiated foods, there is no indication that irradiation provides a unique problem. Commonly accepted methods of pre-enrichment and recovery, the authors conclude, should be used for the evaluation of foods. FTP
[6 figures, 3 tables, 13 references]

0.4

Results of the investigation indicated that movements of pigment granules at specific times in early embryonic development are controlled by cycles of cortical events which are independent of mitosis and may involve microfilaments [thin fibers involved in contractions] but not microtubules (thin rods in support structure of the cell and separating chromosomes). SW
[3 figures, 24 references]

0.5 VIBRIO PARAHAEMOLYTICUS

Fishbein, M., and J. C. Olson
Alimenta 11, No. 3, 93-95 (1972) (In English)
BFMIRA Abstracts 25, No. 8, Abstract No. 2869, 575 (Aug. 1972)

The incidence of food poisoning in the U.S.A. caused by Vibrio parahaemolyticus is reviewed. The organism has been isolated from fish, shellfish and crustaceans of the Pacific coast. Until recently it appeared that food poisoning caused by this organism was confined to Japan. C.S.E. Reprinted

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0.4

These authors list evidence from studies on laboratory animals and man which suggests that dietary carrageenin does not cause ulceration in the colon. This view is questioned in a reply by two other workers who have observed changes in the colon of the rabbit and guinea pig caused by relatively small quantities of degraded carrageenin in the drinking water. L.P.

Reprinted

0.4 CARRAGEENIN AND ULCERATIVE COLITIS

Sharratt, M., et al.
Gastroenterology 61, No. 3, 410-412 (1971)
BFMIRA Abstracts 25, No. 8, Abstract No. 2848, 571 (Aug. 1972)

0.38 (0.31) ENZYMIC CONVERSION OF 5α-CHOLEST-8(14)-EN-3β-OL TO 5α-CHOLESTA-8,14-DIEN-3β-OL

Lutsky, B. N., and G. J. Schroepfer, Jr. (Sch. Chem. Sci., Univ. Illinois, Urbana, Ill.)
Chemical Abstracts 76, No. 19, 110841b (May 8, 1972)

0.5 (9.19) EXTENSIVE MICROBIAL DEGRADATION OF DDT IN VITRO AND DDT METABOLISM BY NATURAL COMMUNITIES

Pfaender, Frederic K., and Martin Alexander (Graduate Field of Microbiology and Laboratory of Soil Microbiology, Cornell University, Ithaca, NY 14850)
Journal of Agricultural and Food Chemistry 20, No. 4, 842-846 (July-Aug. 1972)

D. D. Focht and M. Alexander (Science 170, 91 (1970)] demonstrated that DDM [bis(p-chlorophenyl)methane] could be degraded by a strain of Hydrogenomonas. DDM is a product of the microbial degradation of DDT [1.1.1-trichloro-2.2-bis(p-chlorophenyl)ethane]. The present study was carried out to determine whether this bacterium could metabolize the insecticide itself and cleave one or more of the compound's benzene rings. Also, the authors attempted to find out how the pesticide would be transformed in samples from natural ecosystems containing heterogeneous microbial communities.

Cell-free extracts of bacterium Hydrogenomonas sp. converted DDT to DDD [1.1-dichloro-2.2-bis(p-chlorophenyl)ethane], DDMS [1-chloro-2.2-bis(p-chlorophenyl) - ethane], DBP [4.4'-dichlorobenzophenone], and several other products under anaerobic conditions. When whole cells and oxygen were subsequently added, p-chlorophenylacetic acid was formed. Thus, it was demonstrated that enzymes of a single bacterium can convert DDT to ring-cleavage products. A strain of Arthrobacter sp. grew on p-chlorophenylacetic acid, forming p-chlorophenylglycolaldehyde and other products. The action of two bacteria, then, can lead to biodegradation of DDT.

(over)

1.0152 (9.2) A SURVEY OF THE FISHING INDUSTRY IN GOA

Naik, D. P., and M. R. Kulkarni (Directorate of Fisheries, Panaji, Goa, India)
Published by Directorate of Fisheries, Government of Goa, Daman and Diu, Panaji, Goa, India (1970), 41 pp.

Goa is an independent state situated on the west coast of India about 300 miles south of Bombay. Estuaries formed by seven major rivers provide protective shelter for fishing boats.

This survey was made in 1966-1967 by interrogating 42% of the households engaged in the fisheries. The fishing season for all types of fish begins in September (at the end of the monsoon season) and lasts to the end of May. The busiest period in the season occurs from September to January upon the arrival of sardine and mackerel schools in shallow waters. There are five main fishing techniques employed in the marine fishery: beach seining, gill netting in off-shore waters, cast netting in shallow waters, hook-and-line fishing, and mechanized fishing. Of these the most important is beach seine or "rampon" fishing engaging 42% of the fishermen. Freedom from heavy surf and a smooth sea bottom are the coastal conditions that favor beach seine operations.

Inland fishing gear consist of the cast net, gill net, and stake net. Stake net fishing is carried on throughout the year. The right to a stake net site on a river must be purchased from the Government. Fish supplies are low in the monsoon season because marine fishing practically stops. Consequently, consumer demand brings high prices for fish caught in the rivers. However, the amount of fish caught in the rivers is relatively meager.

(over)

0.5 CLOSTRIDIUM BOTULINUM TYPE F: ISOLATION FROM VENISON JERKY

Midura, T. F., G. S. Nygaard, R. M. Wood, and H. L. Bodily (Microbial Diseases Laboratory, California State Department of Public Health, Berkeley, Calif.)
Applied Microbiology 24, No. 2, 165-167 (Aug. 1972)

C. botulinum type F was first isolated by V. Moller and I. Scheibel [Acta. Pathol. Microbiol. Scand. 48, 80 (1960)] in 1958 from a home-prepared liver paste that was involved in an outbreak of human botulism on the Danish Island of Langeland. Subsequently, type F strains have been isolated from marine sediment from the Pacific Coast, salmon from the Columbia River, crabs from the eastern coast of the United States, and soil samples in Argentina. The first (and only) reported outbreak of botulism involving C. botulinum type F in the United States occurred in California in 1966. Home-prepared venison jerky was involved. Twenty people ate the jerky; 3 developed botulism, 2 developed mild gastro-enteritis, and 15 remained asymptomatic. The present paper describes the laboratory work performed in connection with the outbreak, describes the characteristics of the C. botulinum type F strain isolated, and compares this strain with that of the Langeland (Denmark) type F strain and a type E strain.

The isolate differed from the Langeland type F strain in being nonproteolytic. The authors note that neither the type F strain isolated from venison jerky nor the Langeland type F strain was water related. (Earlier work on the distribution of C. botulinum type F in nature suggests that it is in some manner related to salt-water or fresh-water environments.) In the outbreak described, neither the organism nor the toxin was detected in any of the ingredients used in the preparation of the venison jerky. Opportunity for contamination of the dressed venison had been present, and quite likely the soil was the probable source of the organism. [1 table, 16 references] FTP

2.111 (2.1121) SPOOLING SYSTEM IMPROVES WIRE ROPE LIFE

Anonymous
Australian Fisheries 31, No. 8, 30-31 (Aug. 1972)

The Lebus system of spooling control is achieved by grooves in the core of the trawl drum which guide the first layer of rope in a smooth pattern.

Figure 1 shows how the warps of rope are layered onto the grooved drum. Figure 2 shows how the groove is parallel to the drum flanges except for the two angled sections where the groove moves across the drum

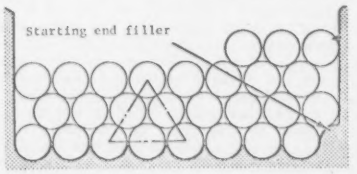

Fig. 1 (Reprinted)

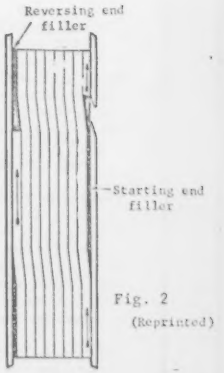

Fig. 2 (Reprinted)

(over)

0.5 VIBRIO PSYCHROERYTHRUS SP. N.: CLASSIFICATION OF THE PSYCHROPHILIC MARINE BACTERIUM, NRC 1004

D'Aoust, J. Y., and D. J. Kushner (Department of Biology, University of Ottawa, Ottawa, K1N 6N5, Ontario, Canada)
Journal of Bacteriology 111, No. 2, 340-342 (Aug. 1972)

A red, motile, gram-negative, rod-shaped bacterium, formerly known as marine psychrophile NRC 1004, was classified as Vibrio psychroerythrus sp. n. The bacterium was originally isolated from flounder eggs by K. Eimhjellen of Trondheim, Norway. It is of special interest because it is an obligate psychrophile and because it has exacting salt requirements. It grows at 0° to 19° C, but dies and rapidly lyses at 21° C or higher. The organism needs relatively high concentrations of Na^+ and Mg^{2+} ions for stability. At one time the organism was thought to be related to the genus Serratia. The present work shows that the organism should be assigned to the genus Vibrio.
[2 tables, 23 references] FTP

0.5 SPORULATION AND ENTEROTOXIN PRODUCTION BY MUTANTS OF CLOSTRIDIUM PERFRINGENS

Duncan, Charles L., Dorothy H. Strong, Madeleine Sebald (Food Res. Inst., Univ. Wisconsin, Madison, Wis.)
Chemical Abstracts 76, No. 25, 150870s (June 19, 1972)

0.5 (9.19)

Major metabolites formed by microbial communities of sewage and of fresh water containing sediment were DDD and DBP; small amounts of DDMS and 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene were formed but no p-chlorophenylacetic acid accumulated. When p-chlorophenylacetic acid was added to microbial communities of sewage, it was rapidly decomposed.
[5 figures, 2 tables, 19 references] FTP

0.5 SALMONELLAE IN FLAT FISH IN COASTAL WATERS

Wuthe, H. H., and G. Findel
Arch. Lebensmittelhyg. 23, No. 5, 110-111 (1972) (In German)
BFMIRA Abstracts 25, No. 8, Abstract No. 2863, 574 (Aug. 1972)

Samples of 51 flounders and plaice were examined for salmonellae. Salmonella typhimurium was detected in 3 cases in the intestine and liver and in one case S. manchester was detected in the bile. C.S.B. Reprinted

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2.111 (2.1121)

one-half pitch to give a full pitch of movement per revolution.

Two important requirements that govern applicability of the system are the fleet angle and the need for adequate tension at all times to ensure that the rope will stay tightly in its position. To obtain a perfect winding pattern the fleet angle (shown in Figure 3) should be kept between a maximum varying from 1-1/4° and 1-3/4°, and a minimum of 1/4°, according to operating conditions.

In addition to increasing rope life, the system is said to reduce labor and maintenance costs.
[3 figures, 2 photographs]

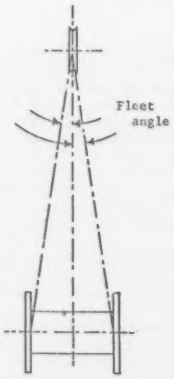

Fig. 3 (Reprinted)

SW

1.0152 (9.2)

The Government is encouraging fish culture as a source of food. Carp are being raised in demonstration ponds with good results. Indigenous fishing craft are dugout canoes of under 1-ton capacity, and plank-built boats, with an outrigger, of over 3-ton capacity. There are 3,595 nonmechanized boats in Goa.

The major part of fish production consists of mackerel and sardine. The total catch of all marine species in 1968 was 18,888 tons. Estimate of the total river stake net catch is 3,000 tons annually. Most of the catch is consumed locally in fresh condition. Surplus mackerel and sardine are dry salt cured. There are four canning plants which operate only in the mackerel-sardine catching season. Cold storage plants have become available for quick freezing and storing fish. Development of a frozen fish (shrimp) export trade is foreseen.

The Government has increased funds allocated for the development of the fisheries including: training programs, exploratory fishing, ice factory and cold-storage plant building, fish culture, fishery research and statistics, fish markets, and subsidies to cooperatives in purchases of mechanized boats and fishing supplies. The Government has promoted the mechanization of boats because they can be used in deep-sea fishing to increase the total catch and to keep the canneries busy all year. Mechanized boats can be used either for purse seine or trawl fishing. In 1968-69, two mechanized purse seiners caught 471,946 kilograms of mackerel and sardines. There were 31 mechanized boats in Goa in 1969.

The chief fishery potentials are in prawns and increased catches of mackerel and sardines. Increased mechanization of boats, more ice plants and frozen storage facilities, and increase in the use of canning facilities are expected to influence the expansion of the Goan fisheries.
[30 tables] SW

2.1125 PURSE SEINING BY NET DRUM

Anonymous
Fishing News International 11, No. 8, 43, 46, 49 (Aug. 1972)

More fishermen from British Columbia, Canada, use the drum seine than the conventional power block seine. Many Washington State boats are equipped to fish with either seine.

The advantages of the drum seine lie in the fewer crew members needed (four compared to seven required for a block seine); the larger number of sets per day that can be made (17 sets compared to 10 for a block seiner), and flexibility.

The components of a drum seine are as follows. The corkline is a line fitted with floats, which supports the "up-side" of the net and prevents it from sinking. The leadline is a weighted line that pulls the "down side" of the net into position causing it to become a curtain between the corkline and the leadline. Beneath the leadline bridles position and support rings through which the purse line runs freely. A bunt, or fish bag, or sock is located at one end of the net and is made of heavy webbing to support the massed catch.

Both ends of a block seine are shaped the same, the central part of the net being deepest, with a slight taper towards both ends. A drum seine is sharply tapered at the towing or wing end of the net. The leadline and the corkline thus come together at a single point and are fastened to a towline; the towline is wrapped on the drum. The first purse ring will be about 30 fathoms away from the towing end of the net; that section of the net cannot be pursed. The purse line is hung in the rings in several sections, with a swivel at each section. This arrangement permits the net to be partially pursed at any of several points during the retrieving portion of the set. (over)

2.116 AUTOMATIC LORAN THE NEXT STEP FORWARD

Smoler, David E. (Harnett Marketing, Inc.)
Fish Boat 17, No. 8, 31 (Aug. 1972)

Shore-based loran transmitting stations emit short pulses of radio frequency. They are emitted from a master or reference station and from a slave station at a different geographical location. The pulses are synchronized so that there is a fixed time delay between pulses from each station. The relative time for a pulse to arrive is measured and indicated by the loran receiving equipment. A time difference is converted into a reading in miles. From special tables prepared for the pair of loran stations involved, the line of position of the boat is determined. Similar observations made on a second pair of loran stations yield a second line of position; the intersection of the two lines establishes the position of a boat. Measuring of the relative times of arrival of the pulses is accomplished by matching the wave form of the pulse envelopes displayed on the face of a cathode ray tube through adjustment of calibrated time-delay controls.

These manual adjustments have been eliminated in an improved loran receiver which automatically matches the pulse to find the time-delay. The result is displayed in digital form. This new loran receiver is also more reliable because of use of integrated circuits and other refinements.

The author suggests that navigation is easiest when two automatic tracking receivers are used. With each turned to a different pair of stations, position is always known. In this manner a constant heading can be maintained during a drag in spite of wind or current influences. In addition, repeaters placed in strategic locations as at the wheel, flying bridge, or winch can free a man for additional (over)

2.116 THE ROAD TO SSB (SINGLE SIDEBAND)

Anonymous
Fish Boat 17, No. 8, 28-29 (Aug. 1972)

Early radio transmissions occupied wide bands on the radio frequency spectrum; consequently, as the number of transmitters increased in an area, interference between them also increased. The need then and now has been for highly selective, narrow band transmissions to reduce interference and to permit an increase in the number of broadcasting stations on the dial.

A common method of radio communication is through the transmission of a carrier frequency; to convey a message the carrier is modulated by voice or other signals. The carrier frequency radiates continuously whether it is modulated or not. In addition to the carrier frequency two sidebands are unavoidably radiated in the transmissions. Sidebands are radiations above or below the accompanying carrier frequency. This method is called amplitude modulation (AM) or double sideband, and it is wasteful of valuable spectrum space.

The single sideband system (SSB) has been developed from the AM system; the carrier and the other sideband have been eliminated by filters. Thus the SSB transmission occupies the narrowest possible space on the dial. Furthermore, power is used more economically. The SSB does not radiate until a signal is impressed on the system. The SSB receiver is highly selective thereby keeping out unwanted noise. The SSB system must be kept in exact adjustment to transmit signals in a narrow band. If it is slightly out of adjustment, transmissions will radiate out of the narrow band and cause interference in other channels.
[3 figures] SW

2.116 MULTI-STYLUS DEPTH RECORDERS
(2.146)
Masucci, Joseph E. (Benmar Division, Computer Equipment Corp., Santa Ana, Calif.)
Fish Boat 17, No. 8, 30, 57-58 (Aug. 1972)

The conventional depth recorder has a mechanical scanning system which consists of a motor-driven stylus rotating in contact with recording paper which changes color by burns from electrodischarge. The signals reflected from a target are received, amplified, and applied to the stylus. The color of the paper changes at the points where the stylus was in contact when the echo signals were applied.

In this system the rotating speed of the stylus must be increased as the distance to the target decreases. A depth recorder that operates most of the time for shallow water must have a stylus rotating at higher r.p.m. (revolutions per minute) than one operating over deeper water.

There is a practical limit to the r.p.m. of a motor in a depth recorder cabinet. Another limiting factor is that two or more different echos cannot be recorded simultaneously.

The new multistylus depth recorder solves these problems. The styli are stationary and not subject to mechanical failure. The train of styli is electronically scanned at varying speeds to permit instantaneous recording, including recording objects near the surface. High accuracy is another important advantage which permits monitoring of expensive nets on the bottom to provide for position adjustments in preventing damage by changes in terrain.

The reference point of the scanning system is the seabed; since the machine can record more than one signal simultaneously, fishermen can see expanded recordings of fish on or near the bottom. These signals show up at a constant width (over)

2.11 AFTER FIVE YEARS--BOULOGNE NET TEST TANK

Noel, H. S.
World Fishing 21. No. 5. 40-42 (May 1972)

In 1967, a water circulation tank was built by the Chamber of Commerce at Boulogne-sur-Mer, France, and used by the Institute Scientifique et Technique des Pêche Maritimes. The purpose of the tank was to study scale model trawling gear in action. The closed circuit tank provided for ease of viewing by a stationary group without the time limit imposed by a tank with a towing carriage.

Application of the tank to solving problems in fishing gear design has been successful; skippers, scientists, and net designers from many countries have shown interest in the tank.

The scale model nets used in the test tanks are not proportional in relation to twine and water resistance, but they behave as a full size trawl in response to changes in rigging, warp angle, speed, and type of door. Response of the models has been so accurate that preliminary test results enabled full scale tests to be undertaken with predictable results.

Tests of models revealed effects which would have been almost impossible to detect without the use of skin divers. Incorrect settings of bridles on a semi-pelagic trawl were observed. The settings caused meshes on the lower wings to close, while in the upper wings they were excessively open. Another effect seen was the distortion of the trawl near the cod-end which could cause fish to become enmeshed instead of flowing smoothly into the bag.

Scale models of otterboards could also be studied in relation to warp length/depth ratio, towing speeds, and other factors. Sea trials confirmed many of the test tank results. The use of the test tank has greatly reduced the cost of designing more efficient trawl gear.

[5 photographs, 1 diagram] SW

2.1125

A drum 10 ft. wide, with a 24-in. diam. shaft between end plates 8 ft. in diam. can handle a 100-ft. lead on a net 200 fathoms long with 5 strips of 4½ in. webbing in depth. Such a drum is powered with a 100 hp. hydraulic motor, with power forward and reverse, a freewheeling valve, and a good brake to prevent the drum from turning faster than the net is unreeling.

The drum is mounted on the stern. A roller, mounted behind the drum and extending beyond the stern, provides a flat, low friction surface for the net to slide on as it is set or retrieved. Fairleads, just forward of the roller, guide and bunch the net (as it is reeled aboard) to wind evenly on the drum.

The drum seine is set in the same manner as the block seine; however, the skipper, if he finds it necessary, may stop and retrieve the net at any stage of the operation. In addition, he may partially set the net, or purse it from both ends, or purse it from the bunt end while retrieving the towing end.

[3 photographs, 1 diagram] SW

2.116

beneath the normal recording which allows for analysis in the detection of schools of fish. Observations of the density, distribution, and position of the schools can be made near or within the selected depth range. Recordings are stable because the system is unaffected by variations in the external power supply.

[2 photographs, 1 reference] SW

2.14 AUTOMATION OF NAVIGATION AND TACTICAL CONTROL IN FISHING
(9.2)(0.8)

Ol'khovskii, V. E., M. N. Andreev, A. A. Levin, and V. I. Yakovlev
Izdatel'stvo "Pishchevaya Promyshlennost," Moscow, U.S.S.R. (1970)
Translated from Russian for the Israel Program for Scientific Translations, Jerusalem (1972). Available from the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22151. Order No. TT 71-50120.

This book is approved by the Ministry of Fisheries of the U.S.S.R. as a textbook at institutions of higher learning of the Ministry of Fisheries. The various chapters are I. Information Flows on a Fishing Vessel, II. Mathematical Models and Algorithms for the Basic Problems of Fishing Navigation, III. Mathematical Foundations of Tactical Fishing Control, and IV. Automated Fishing Navigation Complexes. FTP

2.116

work. While the boat is automatically held to a course the repeater, in an easily seen location, shows position at all times; thus eliminating the need for the skipper to run to the master receiver to check the position.

The author further suggests that advantages in labor-saving, ease of operation, and convenience of the automatic tracking loran receiver will promote its increased application in the future. SW

2.3 SHRIMP PROCESSING

Machinefabriek NVB & Bedrijven Woerdt VD (pat.)
British Patent 1,268,207
Food Technology 26, No. 8, 96 (Aug. 1972)

This apparatus is designed to remove the shell from shrimp (tails). FTP

2.1474 INSHORE LOBSTER FISHING

Everett, John T. (Technical Advisory Division, National Marine Fisheries Service, NOAA, Washington, DC 20235)
Fishery Facts-4, 26 pp. (Oct. 1972) National Marine Fisheries Service Extension Publication, Seattle, Wash. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Price $0.25.

This leaflet contains a description of the equipment and methods now being used in the inshore lobster fishery along the coast of the United States. It describes the construction of the recommended lobster pot, fishing methods, costs of fishing, and regulations. FTP

[20 figures, 8 illustrations, 4 references]

2.116 AUTOMATIC PILOTS FOR THE FISHING FLEET

Campbell, William F., Jr. (Energy Control Corp., Bellevue, Wash.)
Fish Boat 17, No. 8, 33, 61-63 (Aug. 1972)

The automatic pilot is comparable to the helmsman of a boat. He watches the boat's binnacle, keeping the boat on the desired course by turning the wheel to adjust the rudder setting when the binnacle indicates that the boat is off course. The rudder adjustment will turn the boat back to the proper course. As the binnacle indicates that the boat is coming back to course the helmsman returns the rudder to "dead ahead" by turning the wheel. The helmsman continues to watch the binnacle and will make adjustments to the rudder to maintain the desired course whenever necessary. Furthermore, the experienced helmsman is aware of sea conditions; rather than try to hold a precise heading in heavy seas, he tries for an average course, allowing the bow to work back and forth across the desired heading.

An autopilot works in a manner similar to the helmsman; it senses the heading it has been set to maintain and transmits signals to the rudder actuator control to maintain the required position. If the autopilot senses an off course condition, signals will be transmitted to rudder control to make adjustments that will return the boat to the desired heading. Feedback signals from a position sensing device on the rudder cause the autopilot to sense that the rudder is in the required position.

An autopilot should have a boat speed control. The amount of rudder movement is related to boat speed since more rudder movement is required at low speed and less movement at higher speeds. In addition, in following seas, rudder requirements are usually different than in other headings. In this condition more rudder

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2.9 NITRITES IN TROUBLE

Anonymous
Nature 239, No. 5367, 63-64 (Sept. 8, 1972)

The possibility that nitrites may combine in the stomach with amines and amides to form highly carcinogenic nitrosamines is cause for growing concern. The reaction between these substances occurs readily in test tubes. Agents of the Food and Drug Administration (FDA) argued that the low levels of nitrite permitted by regulation are not known to combine with amines in the stomach; furthermore, secondary and tertiary amines are rarely found in nature. However these amines are in many widely used drugs, including the antibiotic oxytetracycline; a drug used by diabetics, tolazamide; and the drug used to control alcoholism, disulfuram. The results of tests in which mice were fed mixtures of nitrites and amine-containing drugs show that tumors were produced.

Critics of the policies of the FDA charge that regulation of nitrites in foods are too lax. A congressional subcommittee charges that the 200 p.p.m. limit set in 1925 by the Department of Agriculture (USDA), and continued ever since, is without scientific justification.

A major issue is based on an apparent contradiction. In regulating chub fish curing, FDA required a minimum of 100 p.p.m. of nitrites; no lower limit had been set for meat. A lawsuit has been opened based on the contention that USDA licensed use of nitrites as a curing agent, not as a preservative, which the FDA minimum requirement in fish indicates. Therefore the argument continues, nitrites (as

(over)

2.3 (2.15) BETTER UTILIZATION OF FISHERY PRODUCTS THROUGH IMPROVED AND NEW HANDLING AND PROCESSING CONCEPTS

Groninger, Herman S., Jr. (Pacific Fishery Products Technology Center, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. East, Seattle, WA 98102)
Journal of Milk and Food Technology 35, No. 8, 479-481 (Aug. 1972)

Refrigerated sea water (RSW) has been used as a medium for chilling whole fish at sea and at processing plants ashore. Addition of CO_2 to RSW increased storage life of chum salmon and rockfish by at least 1 week.

The commercial picking of cooked crab and the flotation procedure for separating shell and tendon from crabmeat are hand operations. Up to 15-20% of crab waste can be recovered as crabmeat through use of a centrifuge. Chopped crab was prepared in a saturated brine slurry and fed into a centrifuge. In all instances, the meat was separated from shell and tendon; and the shell was free from meat.

A laboratory model of a Japanese deboner was studied. The machine separated fish flesh from skin and bone. The yield of flesh was high in proportion to the whole body and was in minced form, which suggests the possibility that underutilized species of fish can be used for food preparations such as fish sticks and fish sausage. [4 references] SW

3.2497 TIME-TEMPERATURE INDICATING SYSTEM "WRITES" STATUS OF PRODUCT SHELF LIFE

Hu, Kwoh H. (Engineering Sciences Div., General Equipment & Packaging Laboratory, U.S. Army Natick Laboratories, Natick, MA 01760)
Food Technology 26, No. 8, 56-58, 60, 62 (Aug. 1972)

This article describes the theoretical basis for and the development of a time-temperature indicating system that provides information related to product shelf life. The system is based on the concept that the shelf life of a product and the permeation of a fixed quantity of oxygen through a plastic film vary with temperature in a similar manner. The device consists of an oxygen-reacting chemical system in a plastic pouch; the amount of reaction that takes place between the chemical and oxygen depends upon the amount of oxygen that permeates the plastic film. The amount of oxygen permeating the film (thus the amount available to react with the chemical) depends upon the exposure time and temperature. In actual practice the device can be attached to the exterior of the food container or placed in the area where the foods are stored.

The chemical system used was a solution of sodium anthraquinone β-sulfonate and zinc dust dissolved in aqueous alkali. This solution is blood-red in color and is opaque. On exposure to air the solution turns colorless and becomes clear. In practice, a written message is included in the sealed plastic pouch containing the opaque red solution. When the solution becomes oxidized in storage (at a rate depending upon the time and temperature) the solution becomes colorless and clear and the message becomes visible. A multistage indicating system can be achieved

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2.3 APPARATUS FOR SHUCKING SHELLFISH

Wenstrom, Richard T. (Hampton, Mass.), and Thomas S. Gorton, Jr. (Cambridge, Mass.); Slade Gorton & Co., Inc., Boston, Mass. (pat.)
U.S. Patent 3,683,458 (Aug. 15, 1972)

This patent is for a method and the equipment for shucking fresh scallops and for separating the viscera from the meat. FTP

2.3 FISH COOKING APPARATUS

Gnaedinger, R. H.; U. S. Secretary of the Interior (pat.)
U.S. Patent 3,663,719
Food Technology 26, No. 8, 95 (Aug. 1972)

Ground fish is cooked with steam while in a thin layer between perforated parallel plates. FTP

2.116

movement is required to steer a precise course. The autopilot will react correctly to this condition when the "slow" boat speed setting is in effect. A boat speed control gives the autopilot flexibility in adjustments necessary in following seas.

An automatic rudder trim device in conjunction with the autopilot will provide for adjustment in dead ahead rudder position if emergencies occur underway, such as wind across the bow, or dragging fishing gear over the side.

Most autopilots, as in the boat's binnacle, use a direct, magnetic-sensing heading indication. This type does not operate properly inside a steel hull. To avoid deviations in the performance of the autopilot, its magnetic compass should be fitted with electrical interconnections so that it can be mounted outside, usually on top of the pilot house. SW
[3 figures]

3.2497

by using two or more pouches containing different quantities or concentrations of the indicator solution. FTP
[2 figures, 5 tables, 7 references]

3.0 THE PRESERVATION OF FISH

Simmonds, C. K.
Fd Inds S. Afr. 24, No. 12, 24+49+31 (1972)
BFMIRA Abstracts 25, No. 8, Abstract No. 2897, 581 (Aug. 1972)

Figures showing the size of the world catch from 1948-68 are given and include the amount frozen, cured and canned. The causes of spoilage are briefly discussed and methods used to extend storage life described. Canning and freezing at sea appear to be the best means of ensuring high quality fishproducts. I.P.
Reprinted

3.8 TREATMENT OF PICKLED [FISH] MEAT WITH FAT CONTAINING GLYCEROL ALIPHATIC ACID ESTERS

Matsumoto, Shoji, Akiji Miyakawa (Riken Vitamin Oil Co., Ltd.) (pat.)
Japanese Patent 16582/71 (May 24, 1971)
Chemical Abstracts 77, No. 5, 33123k (July 31, 1972)

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preservatives) are not exempt from the Food and Drug Act as are other additives approved before the Act came into force. The argument is complicated in that nitrites may prevent the growth of the causative agent of botulism in addition to their ability to impart red color to meats.

Not all cured products need nitrites to control growth of the causative agent of botulism. Bacon is cooked at temperatures that destroy the spores and toxin of the organism. There is doubt also, of suitability of some cured meats as cultures media for spore formation. The critics argue that where nitrites are not necessary to prevent hazard of botulism, FDA should more strictly regulate their use.

The FDA contention holds that until the hazard can be proved, use of nitrites should continue. The critics reply that if there is a risk of cancer nitrites should be strictly regulated until no risk is proven. SW

2.3 SHRIMP DEHEADER

Ward, Hubert (1412 Choctan Ave., Metairie, LA 70005) (pat.)
U.S. Patent 3,691,592 (Sept. 19, 1972)

This apparatus is used to dehead whole shrimp. FTP

2.3 APPARATUS FOR SHELLING SHRIMP

Muller, Hendrikus Gerhardus (1169 Gronausestraat, Hengelo, Netherlands) (pat.)
U.S. Patent 3,691,591 (Sept. 19, 1972)

This apparatus deheads whole cooked shrimp, then separates the shrimp meat (tail portion) from the shell. FTP

3.337 (3.338)(0.8) ENGINEERING CONSIDERATIONS IN RETORT PROCESSING OF FLEXIBLE PACKAGES

Davis, R. B., F. E. Long, and W. F. Robertson (Continental Can Co., Inc., 1200 W. 76th St., Chicago, IL 60620)
Food Technology 26, No. 8, 65-68 (Aug. 1972)

This article is a discussion of the engineering aspects related to the retort processing of foods in flexible pouches. The pouch used in recent experimental work consisted of a 1/2-mil polyester x 1/3-mil aluminum foil x 3-mil C-79 polyolefin structure. The film has a seal strength greater than 6,000 g./in. of width at room temperature and will maintain about 1,500 g./in. of width at a retort temperature of 250° F. The 3-side-sealed pouch is placed in a vacuum chamber and the food product is introduced into the open end. Vacuum is drawn in the chamber and the open end of the pouch is sealed. Impulse heat sealing is used, rather than conventional heat sealing, because it can overcome some of the adverse effects resulting from contamination of the seal. Because the heat seal strengths of the pouch are reduced at retort processing temperatures, it is necessary to process them with superimposed air pressure to protect the seals and to prevent rupturing of the pouch during heat processing and cooling.

Although many of the engineering aspects are yet to be developed for commercial application with high-speed, high-volume units, the engineering know-how is available in the United States. Retort pouch packaged and processed foods have many advantages as follows: (1) The foods have high quality, flavor, color, and texture because they are processed a shorter time; (2) the packaged foods do not

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6.19 NUTRITIONAL REPORTS ON THE ANNUAL MEETING OF THE POULTRY SCIENCE ASSN. PART I: LAYING HEN NUTRITION

Couch, J. R. (Department of Poultry Science, Texas A & M University, College Station, TX 77840)
Feedstuffs 44, No. 40, 28, 29-32 (Sept. 25, 1972)

The meeting was held August 7-11, 1972, in Columbus, Ohio. The author grouped 110 papers presented at the meeting into subjects for his report.

Losses from poor eggshell quality are troublesome to the industry. Calcium source is not a factor. A combination of pulverized and selected particle sizes is the best supplement. The guide level of calcium supplements vary: 3.5-3.7% in early stages of production and mild temperatures; 3.75-4% in hot weather. Calcium in excess of 4.5% results in decreased egg production and feed conversion.

Phosphorus in hen diets exceeding 0.7% results in a decrease in performance and a detrimental effect on eggshell thickness. Hens can utilize phytin phosphorus. Antibiotics were found to assist the hens in overcoming stress of abrupt changes in temperature, or prolonged high temperatures, and other types of stress. The broad spectrum antibiotics can be used intermittently, under regulations, with FDA approval. West Germany has approved continuous use of bacitracin in laying hen diets.

A deficiency of sodium chloride was shown to produce a reduction in egg production, decrease feed consumption, and decrease egg size. If the diet does not contain animal protein such as fish meal and bone scraps, the sodium chloride level in the feed should be checked. The requirement for the laying hen is listed as 0.15% sodium equivalent to 0.37% sodium chloride.

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4.1 SEASONAL VARIATIONS IN THE CHEMICAL COMPOSITION OF CORNISH MACKEREL, SCOMBER SCOMBRUS (L), WITH DETAILED REFERENCE TO THE LIPIDS

Hardy, R., and J. N. Keay (Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 7, No. 2, 125-137 (June 1972)

Previous work has shown that lipid content of fish is subject to variation depending on food supply, other environmental influences, and season.

Proximate analyses and determinations of lipids were performed on monthly samples of mackerel caught off the Cornish coast through a period of 1 year (December 1968-November 1969).

Maximum and minimum total-lipid levels were recorded in December and June, respectively. The highest mean lipid unsaturation levels were recorded in November and the lowest in May. An inverse linear relationship was observed between lipid and water content with protein level remaining constant.

The lower lipid content occurs prior to and during the spawning period (March to July). Depletion of fat resources prior to spawning also occurs since, in many species of fish, mobilization of fat accompanies gametogenesis.

The free fatty composition of the lipids contained substantial proportions of long chain fatty acids many of which were highly unsaturated. There was a low level of the 20:1 acid--less than 10%.

The reasons why aquatic organisms require, store, and utilize such highly unsaturated fatty acids is not clear. The authors suggest the overriding requirement is that of maintaining fluidity of the extracellular lipids at lower

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6.54 CRACKERS FORTIFIED WITH FISH PROTEIN CONCENTRATE (FPC)

Sidwell, Virginia D., and Bruce R. Stillings (College Park Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, College Park, MD 20740)
Journal of the American Dietetic Association 61, No. 3, 276-280 (Sept. 1972)

Two experiments were carried out to determine the nutritional quality, sensory qualities, and physical characteristics of crackers containing varying amounts of FPC. Saltine crackers were made according to a formulation used commercially. The test samples were made by replacing 4,8,10,12, or 16% of the flour in the formulation with FPC. The FPC used was made by isopropyl extraction of red hake (Urophycis chuss) according to a method developed at the Natural Marine Fisheries Service. Chemical analyses of the crackers were made for protein, volatiles, ash, fat, and various (10) amino acids; sensory evaluations were made for color difference, texture, and appearance; and nutritive evaluations [protein efficiency ratio (PER)] were made by rat feeding studies.

With each increment of FPC the protein content of the crackers increased by about 2 to 3% (the protein content of the unfortified crackers was 9.4%; that for the crackers fortified with 4% FPC was 12.0%). Fortification of crackers with FPC markedly increased the arginine, lysine, methionine, and threonine content of the crackers. The PER value of the crackers containing 4% FPC was three times that for the crackers with no FPC. The PER value for crackers containing 8% FPC was four times more than that for the crackers with no FPC.

The texture of crackers fortified with 4% or with 8% FPC was as acceptable as that of the unfortified crackers, but the texture of crackers containing 12% or 16%

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temperatures. Other work has shown the melting points of the lipids, in some aquatic organisms, were always just below the mean temperature of the environmental water. Unsaturated lipids with their low melting points may be a means of keeping protoplasmic viscosity within the range of normal metabolic processes.
[2 figures, 4 tables, 26 references] SW

3.337 (3.336) (0.8)

require refrigeration: (3) the pouches are light in weight and the packaged food is compact (contains more food and less liquid); (4) a wide selection of portion packs can be offered because package size can be easily changed; (5) the pouches are easy to open; and (6) the pouches are easy to dispose of because they have little bulk.
No references were cited, but the authors will supply a full bibliography upon request.
[5 figures, 2 tables] FTP

6.54

FPC was less acceptable. The firmness of the cracker (as determined by a shear test) increased in the fortified cracker up to 12% fortification with FPC, but it decreased at the 16% level (nevertheless, the shear value at the 16% level was still higher than that of the unfortified cracker).
The crackers became progressively darker with each increment of FPC. There were no off-flavors in the unfortified crackers and in the crackers containing 0.4 or 8% added FPC after the crackers were stored for 161 days at 72°, 90°, 108°, and 126° F.
[1 figure, 4 tables, 8 references] FTP

6.54 FISH PROTEIN PREPARATIONS

Krassowska Szacillo, Teresa, and Aleksander Skala (Morski Instytut Rybacki) (pat.)
German Offen. (patent) 2,143,277 (Mar. 2, 1972)
Chemical Abstracts 77, No. 3, 18404j (July 17, 1972)

6.19

Reports on the substitution of sulfate for methionine are controversial. More research is needed. The addition of 0.1 p.p.m. selenium to a corn-soy diet had little effect on selenium content of eggs or tissues. Neither selenium nor vitamin E affected egg production, egg weight, body weight, and mortality. Other studies showed the protein requirement of 15% to be adequate; the hen can tolerate and utilize laying diets which vary widely in energy content. Fatty liver syndrome continues to be a problem in the industry. Vitamin B_{12} and choline in the laying hen feed formula increased egg production and egg weight, and reduced liver fat. SW

6.19 SALT CONTENT OF BASIC PROTEIN FEEDS OF ANIMAL ORIGIN AND POULTRY FEEDS

Bodnar, Magdolna (Orsz. Allategegeszegyi Intez., Budapest, Hungary)
Chemical Abstracts 76, No. 25, 152304j (June 19, 1972)

4.6 ROLE OF LIPID ANTIOXIDANTS IN MANIFESTATION OF SOME PHYSIOLOGICAL FEATURES IN FISH

Chernyshov, V. I., S. M. Yakubov, Yu. P. Kozlov, and B. N. Tarusov (Mosk. Gos. Univ. im. Lomonosova, Moscow, U.S.S.R.)
Chemical Abstracts 76, No. 25, 151256h (June 19, 1972)

3.330 CANNED FISH PRODUCT

Kyowa Hakko Kogyo Co. Ltd. (pat.)
Japanese Patent 10984/72, 96 (Aug. 1972)
Food Technology 26, No. 8, 96 (Aug. 1972)

Raw fish meat is treated with dipicolic acids before canning. The acids raise the coagulation temperature of the fish protein and reduce the amount of curd in the canned product. FTP

7.591 CONTINUOUS FLUOROMETRIC ASSAY FOR CATHEPSIN B-LIKE ACTIVITY IN LYSOSOMES

De Lumen, B. O., and A. L. Tappel (Department of Food Science and Technology, University of California, Davis, CA 95616)
Analytical Biochemistry 48, No. 2, 378-385 (Aug. 1972)

[Lysosomes are subcellular organelles which contain digestive enzymes (cathepsins) capable of breaking down many of the cellular constituents. Disruption of the lysosomes and liberation of these enzymes may occur under certain conditions and can lead to lysis of the cell. A cathepsin is any one of several proteolytic enzymes present in tissue or cells. Ref. The Encyclopedia of Biochemistry, Eds. Williams and Lansford, Reinhold, N.Y. (1967). Abstractor's note.]

Cathepsin B was originally defined by its amidase activity on benzoylarginine amide (BAA). The same activity had been demonstrated on benzoylarginine ß-naphthylamide (BANA).

The ß-naphthylamine released during hydrolysis of BANA has been measured colorimetrically by methods that are inconvenient and require attention to details. Work on the hydrolysis of BAA by colorimetric and microdiffusion methods is also inconvenient and tedious. This study shows the conversion of the colorimetric BANA assay to a continuous fluorometric procedure for measurement of cathepsin B activity. The method is rapid, meets the requirement for a valid enzyme assay, lends itself to kinetic measurements, and is more sensitive than the colorimetric BANA or BAA assays.

The enzyme that hydrolyses BANA was found to be different from previously reported cathepsin B activities and is called BANA amidohydrolase.

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9.12 FREE FLOATING MUCUS WEBS: A NOVEL FEEDING ADAPTATION FOR THE OPEN OCEAN

Gilmer, Ronald W. (Department of Zoology, University of California, Davis, CA 95616)
Science 176, No. 4040, 1239-1240 (June 16, 1972)

During the fall of 1971, the author made field observations, using scuba techniques, of the highly modified planktonic gastropods Gleba cordata (Forskål) and Corolla spectabilis (Dall), in the order Thecosomata, in the surface waters of the Florida Current west of Bimini, British West Indies. The data in this article represent the first observations on live members of the order Pseudothecosomata, the first report of Gleba in the Florida Current, and the first record of adults of Gleba in any part of the tropical Atlantic. The biology of these organisms is obscure; because of their extreme fragility and unknown swimming abilities, previous expeditions have collected only a few badly damaged specimens.

These observations revealed that G. cordata and C. spectabilis use a free and unsupported mucus web for collecting food particles. The Gleba and Corolla are extremely rapid swimmers; they have escape speeds of at least 45 cm./sec. The author notes that their delicate bodies, quick reactions, and apparent abundance suggest that traditional plankton-sampling methods may be inadequate to assess their importance in the blue-water plankton communities. Figure 1 shows G. cordata as it appears while motionless in the water; figure 2 shows C. spectabilis swimming toward the surface of a tank in the laboratory; and figure 3 shows G. cordata feeding from its delicate mucus web at a depth of 20 m. in the Florida Current.
[3 figures, 17 references] FTP

9.12 (9.13) BIOLUMINESCENCE IN THE MARINE TELEOST, PORICHTHYS NOTATUS, AND ITS INDUCTION IN A NON-LUMINOUS FORM BY CYPRIDINA (OSTRACOD) LUCIFERIN

Tsuji, F. I. (Department of Biophysics and Microbiology, University of Pittsburgh, Pittsburgh, PA 15213), A. T. Barnes, and J. F. Case (Department of Biological Sciences, Marine Science Institute, University of California, Santa Barbara, CA 93106)
Nature 237, No. 5357, 515-516 (June 30, 1972)

The midshipman fish Porichthys notatus (occurs along the Pacific Coast from Alaska to Baja Calif., Mexico) has over 700 small dermal photophores arranged in rows over the surface of its body. Except for the fish from Puget Sound, the photophores of these fish luminesce during courtship. Luminescence is caused by the emission of light following a luciferase-catalyzed oxidation of luciferin by molecular oxygen. Inasmuch as the luciferin from Porichthys and luciferase reciprocally cross react to give light with luciferin and luciferase with the marine ostracod crustacean Cypridina, the authors carried out tests to determine whether the Porichthys might obtain elements of its luminescent system from its diet. They found that a nonluminescent specimen of P. notatus (from Puget Sound) became luminescent in response to oral administration or intraperitoneal injection of the luciferin from the Cypridina. From this observation they concluded that the deficiency in a P. notatus specimen may be of a dietary consequence. Additional experiments are being conducted to determine the mechanisms responsible and the ecological implications of the phenomenon.
[1 figure, 1 table, 20 references] FTP

9.12 HAWAIIAN-CAUGHT SKIPJACK TUNA AND THEIR PHYSICAL ENVIRONMENT

Seckel, Gunter R. (National Marine Fisheries Service, Pacific Environmental Group, Monterey, CA 93940)
Fishery Bulletin 70, No. 3, 763-787 (July 1972)

Empirical associations between the occurrence of skipjack tuna (Katsuwonus pelamis) in Hawaiian waters and environmental conditions point to the current system as an important cause for the variations in the Hawaiian fishery. Large interyear differences of sea-air interactions in the skipjack spawning areas may affect larval survival and year-class strength. A numerical drift model was used to investigate the contribution of currents to the travel of skipjack from the eastern North Pacific to Hawaii. Floating objects introduced in the model ocean at long 120°W and lat 10° to 20°N converge toward the nortnern edge of the North Equatorial Current near Hawaii in 21 to 23 months. The time of freedom of skipjack tagged in the eastern North Pacific and recovered in Hawaiian waters is of the same magnitude. It is concluded that for skipjack a possible mode of travel from the eastern North Pacific to Hawaii is drifting in the North Equatorial Current. The variability in abundance and size-frequency distributions observed in the Hawaiian fishery can be caused by changes in the current system. Numerical models of the type presented can be verified and so permit progress from the exploratory to the experimental phase in fisheries investigations.
[17 figures, 7 tables, 39 references] Author's abstract

9.12 EVIDENCE THAT PACIFIC OCEAN PERCH (SEBASTES ALUTUS) IN QUEEN CHARLOTTE SOUND FORM AGGREGATIONS THAT HAVE DIFFERENT BIOLOGICAL CHARACTERISTICS

Gunderson, Donald R. (Washington State Department of Fisheries, Fisheries Center, University of Washington, Seattle, WA 98105)
Journal of the Fisheries Research Board of Canada 29, No. 7, 1061-1070 (July 1972)

Certain fish (anchovy, tuna, bream, kilka, roach, ocean perch, cod, and herring) aggregate by size. These aggregations might result from hydrodynamic differences between the individuals (large fish can swim faster and longer than small fish), but some workers believe that there are still other biological differences between aggregations. This paper gives evidence that Pacific ocean perch (Sebastes alutus) stock in Queen Charlotte Sound is subdivided into aggregations of similar-sized fish, and that the aggregations differ in biological characteristics other than length. Market samples of the Pacific ocean perch showed considerable variation in mean length, even when narrowly defined month-depth strata were considered. Also there was considerable between-sample variability in growth. There appears to be a tendency, then, for the species to form distinct aggregations, each with different biological characteristics.
[6 figures, 6 tables, 15 references] FTP

9.12 VARIATIONS IN SIZE AND LENGTH COMPOSITION OF ATLANTIC-MENHADEN GROUPINGS

June, Fred C. (Bureau of Sport Fisheries and Wildlife, North Central Reservoir Investigations, P.O. Box 698, Pierre, SD 57501)
Fishery Bulletin 70, No. 3, 699-713 (July 1972)

This paper gives estimates of size (weight) and length composition of summer schools and fall school-aggregations of Atlantic menhaden based on single-set purse-seine catches and accompanying catch samples obtained in 1955-62. The data show that the fish school by length and the average size of summer schools decreases as the apparent abundance of fish in a given area of the coast decreases. The significance of the school concept in the study of the dynamics of the population and the effects of fishing upon it are discussed, and additional avenues of research are suggested.
[13 figures, 3 tables, 25 references] Author's abstract

9.1 ENDOCRINE REGULATION OF GAMETOGENESIS AND GONAD MATURATION IN FISHES

Dodd, J. M. (Dep. Zool., Univ. Coll. North Wales, Bangor, Caernarvonshire, Wales)
Chemical Abstracts 77, No. 3, 16770b (July 17, 1972)

9.1 TELEOST CAUDAL NEUROSECRETORY SYSTEM. SPERM DUCT CONTRACTION (9.16) INDUCED BY UROPHYSIAL MATERIAL

Berlind, A. (Dep. Zool., Univ. California, Berkeley, Calif.)
Chemical Abstracts 76, No. 21, 122043f (May 22, 1972)

7.591

This method is a fluorometric assay which measures the amount of ß-naphthylamine released when BANA is split by a cathepsin B-like enzyme occurring in rat liver lysosomes. Incubation of the enzyme and substrate is at pH 7.0-7.2 in the presence of sulfhydryl compounds (glutathione or dithioerythritol). The presence of the sulfhydryl compound is an absolute requirement. The fluorescence is measured at 405 nm. emission with excitation at 345 nm.
This assay, while not replacing the BAA assay, should serve as an additional tool for studying lysosomal cathepsins.
[4 figures, 21 references] SW

7.59 IDENTIFICATION OF POISONOUS SUBSTANCES IN DEAD FISH. II. DETECTION AND DETERMINATION OF PENTACHLOROPHENOL FROM FISH EXTRACT

Tokunaga, Seigo (Fukuoka Prefect. Police Headquarters, Fukuoka, Japan)
Chemical Abstracts 77, No. 3, 18157f (July 17, 1972)

9.12 SEX DIFFERENCES IN ELECTRIC SIGNALING IN AN ELECTRIC FISH

Hopkins, Carl D. (Rockefeller University, New York, NY 10021)
Science 176, No. 4038, 1035-1037 (June 2, 1972)

Gymnotid fish (of Central and South America) have specialized organs for the production and reception of electric currents. These organs function as an active sensory system for locating conducting and nonconducting objects in the environment; also, they may be used for intraspecific communication. This study explored the role of electric signals in the reproductive behavior of gymnotids. The study was carried out in the Rupununi District of Guyana, South America, with the fish Sternopygus macrurus. The Sternopygus produces tone discharges of highly stable frequency and which are nearly as long as the period between discharges.
The author found that the electric discharge of S. macrurus is distinctly different from the electric discharges of 10 sympatric species of electric fish in Guyana. The Sternopygus show different electric discharges between the males and females; they differ in their steady-state frequency of their discharges. Males produce variations in their electric discharge during courtship. Apparently, the differences in electric discharges shown by different species and by different sexes have communicative significance.
[2 figures, 17 references] FTP

9.12 CONSIDERATIONS OF THREE PROPOSED MODELS OF THE MIGRATION OF YOUNG SKIPJACK TUNA (KATSUWONUS PELAMIS) INTO THE EASTERN PACIFIC OCEAN

Williams, F. (Institute of Marine Resources, Scripps Institution of Oceanography, University of California at San Diego, P.O. Box 109, La Jolla, CA 92037)
Fishery Bulletin 70, No. 3, 741-762 (July 1972)

Previous evidence suggested that most exploited skipjack tuna (Katsuwonus pelamis) in the eastern Pacific Ocean have a central Pacific spawning origin. Three models are now proposed of the migration of young skipjack into eastern Pacific fishery areas; these are (i) the active migration model, (ii) the passive migration model, and (iii) the gyral migration model. Data utilized and theories advanced in the detailed development of the models are discussed. Mechanisms and timing in all three migration models are dependent on oceanographic conditions and events in the central-east Pacific, which thus have a controlling effect on migration success of incoming young fish. Current skipjack research cruises, in part designed to test the validity of the models, are outlined.
[7 figures, 83 references] Author's abstract

9.13 THE METABOLISM OF NEUTRAL LIPIDS IN THE SPUR DOGFISH, SQUALUS ACANTHIAS

Sargent, J. R., R. R. Gatten, and R. McIntosh (Institute of Marine Biochemistry Natural Environment Research Council, St. Fittick's Road, Aberdeen, Scotland)
Lipids 7, No. 4, 240-245 (Apr. 1972)

This study dealt with the roles of the different tissues of the spur dogfish (S. acanthias) in lipid metabolism and the mechanisms whereby lipid metabolism in the different tissues is correlated. These studies of the cell free fractions of the tissues showed that the liver and the intestine are the major sites of synthesis of triacyl glycerols. Wax esters are synthesized in the liver and to a lesser extent in the intestine and stomach. The muscle does not synthesize triacyl glycerols or wax ester to any significant amount. When fatty alcohol is injected intravenously (in vivo studies), it is massively oxidized to fatty acid, most of which appears in the muscle. Apparently, the liver exports free fatty acids and triacyl glycerols to serum and then to muscle. The free fatty acids, triacyl glycerols, wax esters, and cholesteryl esters are turned over within 48 hr. in the serum; the turnover of triacyl glycerols greatly exceeds the turnover of alkyl diacyl glycerols. This relative conservation of alkyl diacyl glycerols may reflect their possible role in buoyancy. The striking ability of Squalus to synthesize wax esters may reflect an important role for this lipid class in transporting "essential" fatty acids in serum.
[1 figure, 2 tables, 14 references] FTP

9.16 FISH FARMING MACHINES FROM JAPAN

Anonymous
Fishing News International 11, No. 8, 52-53 (Aug. 1972)

The Japanese have been developing commercial aquaculture fisheries projects for locations in waters at least 60 m. deep. Cage-type structures have been used in the past in shallow water to rear food fish or maintain bait fish until ready for use. The spread of pollution has reduced the areas near shore for this type of aquaculture causing development of deeper water methods.

A Japanese fishing company and an engineering company, in collaboration with the government's Fisheries Agency have caused to be designed and constructed for test purposes a durable fish preserve which could be set in deep water.

The submarine fish rearing plant is an eight-sided cage constructed of steel pipe frames and wire mesh. It measures 10 m. wide by 5 m. high, and has a volume of 368 cu. m. In the center a cylindrical steel tank, 2.5 m. in diam. and 7.5 m. high, provides controlled buoyancy through compressed air and controls located in it. The depth to which the cage is submerged can be controlled by radio. The cage will normally be near the surface; in bad weather a signal will cause the cage to submerge. The cage has an inner lining of fiber net which can be gathered upwards when the fish are harvested. The fish will be fed manually from a service boat or automatically through a hose. Successful application of this offshore method could extend the area of the sea for aquaculture.

A team was formed by the Japanese Fishing Agency and the Fisheries Experimental Station of the Hokkaido Government to develop efficient methods of cultivation and collection of shellfish through a block system approach. Each subteam or block was

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9.16 MARICULTURE COMES OF AGE

Gordon, Henry S.
Chemical Engineering 79, No. 17, 26-28 (Aug. 7, 1972)

Mariculture, the controlled cultivation of fishery stocks, promises to become big business with the chemical process industries increasingly involved. Union Carbide's affiliate, Ocean Systems, Inc., began a salmon cultivation project in 1970 that appears to be ready to give returns on the investment. Domsea Farms, Inc., is the new name of the firm. It has shortened the time from egg to market and is now marketing 1/2- to 3/4-lb. fish. Unilever, Ltd., has settled on salmon for its mariculture efforts in Scotland. The company is working on methods to promote faster, more uniform growth of salmon. Marifarms, Inc., of Panama City, Fla., has invested $6 million into shrimp farming. This venture has yielded 500,000 lbs. of shrimp. Dow Chemical has been engaged in shrimp farming at Freeport, Tex., for about 3 years. The company has a grant from NOAA to work with Texas A & M University on shrimp culture research. Texas A & M has combined with Central Power & Light Co., of Corpus Christi, Tex., to investigate salinity in relation to shrimp culture and the feasibility of raising shrimp in a lake near a new generating station. Ralston Purina is involved in supplying feed for shrimp farming and importing shrimp for its packing plants.

Managements of other generating plants are joining mariculture ventures to make use of thermal discharges to show critics thriving marine life in such waters.

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9.13 THE PRESENCE OF UNUSUALLY HIGH LEVELS OF LYSOPHOSPHATIDYLETHANOLAMINE IN A WAX ESTER-SYNTHESIZING, COPEPOD (CALANUS PLUMCHRUS)

Patton, Stuart, Richard F. Lee, and Andrew A. Benson (Lipids Laboratory, Pennsylvania State University, University Park, PA 16802; and Scripps Institution of Oceanography, La Jolla, CA 92037)
Biochemica et Biophysica Acta, Lipids and Lipid Metabolism 270, No. 4, 479-488 (Aug. 11, 1972)

Wax esters occur widely in marine organisms, principally in the calanoid copepods. These copepods and phytoplankton hold key positions at the base of the marine food web. The conversion of the carbon from phytoplankton into wax esters by these crustaceans suggests that there may be an important role for this lipid as an intermediate between photosynthetic product and life in the ocean. Because of the possibility that high levels of wax ester may involve other unique lipid relationships in an organism, the authors examined the polar lipids in the copepod C. plumchrus.

Samples of the copepod were taken in the Strait of Georgia near the Fraser River plume (British Columbia, Canada). The lipids were extracted from the copepods and then analyzed for various phospholipids, fatty acids, and alcohols.

Lysophosphatidylethanolamine containing 78% docosahexaenoic acid is the predominant phospholipid in the marine copepod C. plumchrus. The phospholipids were about 1% of the total lipid, and they contained 48% of lysophosphatidylethanolamine. A high level of docosahexaenoic acid was also present in the other major phospholipids of the copepod; phosphatidylethanolamine contained 43%. The authors propose that the lysophosphatidylethanolamine may be involved in transport of fatty acids utilized in the synthesis of wax esters.
[4 figures, 2 tables, 17 references] FTP

9.12 BODY TEMPERATURE OF DERMOCHELYS CORIACEA: WARM TURTLE FROM COLD WATER

Frair, Wayne (Dept. of Biology, The King's College, Briarcliff Manor, NY 10510), R. G. Ackman, and N. Mrosovsky
Science 177, No. 4051, 791-793 (Sept. 1, 1972)

Data indicate that the large turtle D. coriacea is capable of maintaining a differential between its body temperature and the ambient level in a situation where behavioral regulation (such as moving into the sun) is not possible. The turtle D. coriacea, taken out of cold water, had a body temperature 18° C. above the water temperature. This large differential may be due to the animal's large size favoring heat retention from muscular activity. Cooling rates (k) in water were measured on a second turtle and were in the order of 0.001° C. per minute per degree of difference between body and ambient temperature.
[1 figure, 1 table, 19 references] FTP

9.10 PREPARING BIOLOGICAL SPECIMENS FOR ELECTRON MICROSCOPY (7.1)

Corvin, Irene (IIT Research Institute, Chicago, Ill.)
Research/Development 23, No. 8, 28-32 (Aug. 1972)

This article is a review of methods of preparing biological specimens for electron microscopy, including freeze drying and critical-point drying.
[9 figures, 14 references] FTP

9.16

At Northport, N.Y., the Long Island Lighting Co., has been cooperating with Long Island Oyster Farms, Inc., in experiments. The San Diego Gas and Electric Co., is joining Mariculture Research, Inc., to work on shrimp, lobster, clams, and pompano farming. W. R. Grace, Inc., has begun talks on a joint venture with Oceanography Mariculture Industries, Inc., Riviera Beach, Fla., to research pompano raising facilities.

Problems in physical-chemical reconditioned water after it is used in mariculture are being investigated. Pharmaceuticals, chemicals, and synthetic sea water designed for mariculture need to be studied; and building and equipment materials suitable for use in mariculture environments need to be found.
[1 photograph] SW

9.12 DYNAMICS OF CAROTENOIDS IN FISH TISSUES AND ORGANS IN RELATION TO THE SEX CYCLE

Shmarevich, I. D., and E. G. Sakhnenko (Chernovits. Gos. Univ., Chernovtsy, U.S.S.R.)
Chemical Abstracts 76, No. 21, 124369r (May 22, 1972)

9.16

responsible for developing a particular machine, and the team as a whole then considered methods of combining machines.

One of the results of the team work was the construction of a machine which could traverse a lake bottom. It is a tracked vehicle with a snorkel for air and an exhaust of a diesel engine; it is driven from the surface by a man in a small boat. The machine can be used either to collect seed scallops, or cultivate the lake bed, or exterminate starfish which feed on the scallops.
[3 photographs, 3 diagrams] MS

9.16 DIETHYLSTILBESTROL IN CATFISH FEED

Bulkley, Ross V. (Iowa Cooperative Fishery Unit, Ames, IA 50010)
Transactions of the American Fisheries Society 101, No. 3, 537-539 (July 1972)

In a 25-day feeding test with immature catfish, the author found that diethylstilbestrol had a negative effect on protein synthesis in the catfish even when they were fed levels less than one-fourth those given to cattle. This observation has serious implications where wild populations of catfish are involved. Diethylstilbestrol passes rapidly through cattle with much of its activity retained; fish in streams receiving surface runoff from cattle feedlots could be affected.
[1 figure, 1 table, 10 references] FTP

9.16 RETURN OF THE SEA TURTLE

Sand, George X.
International Turtle and Tortoise Society Journal 6, No. 2, 24-27 (Mar.-Apr. 1972)
(Reprinted from Ford Truck Times, Winter 1972)

The green turtle has been hunted for meat since the crews of Columbus found them on the Cayman Islands in the year 1503. Through the centuries other mariners have stopped off on the islands to replenish meat supplies. In addition, the kitchens of European and American hotels have been demanding turtle meat to be prepared into delicacies for their guests. By the year 1870 a shortage of turtles existed, and today extinction threatens.

Studies of the natural history of the turtle indicate that only one out of 500 hatchlings can survive through the egg stage and subsequent attacks of predators in the open ocean. Further, not until the female turtle is 6 years old will she lay her first eggs. At such a low rate of reproduction the turtle population would never increase without intervention by man.

To reverse the fortunes of the green turtle, Dr. Robert E. Schroeder, a marine scientist, organized an aquaculture business called Mariculture, Ltd., at Sand Creek on Grand Cayman Island. In the facility a breeding pond and beach is provided where females can lay their eggs. Starting tanks protect hatchlings and large rearing tanks hold growing young turtles. In this arrangement turtles are being released to the sea and others are held back to grow to a 160-lb. marketable weight. Thus two purposes are being served: The pressure on the turtle population by meat hunters will be relieved, and additions to the sea population are provided.

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9.16 EFFECT OF CROWDING ON RELATION BETWEEN EXPLOITATION AND YIELD IN TILAPIA MACROCEPHALA

Silliman, Ralph P. (National Marine Fisheries Service, Northwest Fisheries Center, 2725 Montlake Boulevard East, Seattle, WA 98112)
Fishery Bulletin 70, No. 3, 693-698 (July 1972)

An experiment was performed to assess the effect of crowding on yield in Tilapia macrocephala. Populations of nearly equal number and weight were started in control (155.2 liter) and test (77.6 liter) tanks. Food amounts and environmental attributes other than space were the same for both tanks. Each of the two populations was exploited--first at a bimonthly rate of 10% for 14 months, then at a bimonthly rate of 25% for 10 months.

Equilibrium yields at each rate for each tank (four points) were fitted with a Fox exponential surplus-yield model. Deviations from this general population curve showed that yields were greater for the larger tank at the 25% rate and greater for the smaller tank at the 10% rate. This is believed to result from the fact that the entire yield came from growth at the lower rate whereas part of the yield came from recruitment at the higher rate. A low rate of conversion of food to fish (18%) is believed to be due to the large proportion of liver in the diet. [3 figures, 3 tables, 7 references] Author's abstract

9.16 I. AN EXPERIMENT IN UNDERSEA MARICULTURE

Norris, Kenneth S. (Oceanic Institute, Waimanalo, HI 96795), William D. Madden, and Phyllis S. Norris
In Oceanic Institute Report No. OI-72-78-1, A Feasibility Pilot Project for a Method of Open Water Fish Farming, pp. 1-21 (June 1, 1972). No price quoted. Final Report, NOAA Sea Grant No. GH-78. (Oceanic Institute, Makapuu Oceanic Center, Waimanalo. HI 96795)

Mariculture competes with other activities for space at the sea surface. An alternative is to use the sea bottom for mariculture; unused areas of sea floor are noncompetitive with other uses.

Uses of undersea mariculture envisioned are for development of habitat enhancement areas with plastic grass beds made of plastic strips, either enclosed by nets or open, the development of herbivore and carnivore trapping areas, algal rope or net culture, and shellfish culture.

A 6 x 12.5 m. PVC pipe frame was anchored in 26 m. of water off Oahu, Hawaii. Attached to the frame were 4,500 2.5-m. long, 10-cm. wide strips of plastic; each strip had a buoyant bubble plastic border which caused it to float vertically in the water. The course of the microflora and fauna establishment on this bed, including invasion by local fishes, was followed for 5 months. A maximum standing crop of algae was attained in 3 weeks, although the composition of the biota fluctuated constantly. At maximum growth the biota consisted of incrusted algal colonies, diatom films, some barely visible foliose and branching colonies, including hydroids, flagellates, minute worms and molluscs, and a colony of sea hares. The largest organisms lived on the plastic strips constantly. Heavy grazing by passing fish and the hares was observed. Fish of 15 species gathered around or in

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9.17 HERRING SPAWN IN CLOSE-UP
(1,22)

Iles, T. D., and J. F. Caddy (St. Andrew's Biological Station, Fisheries Research Board of Canada, New Brunswick, Canada)
World Fishing 21, No. 6, 14-16 (June 1972)

A fishery on Georges Bank for prespawning and spawning herring was started by Russian fleets in 1961; intensity of fishing increased with participation of other European vessels until 1968, when 400,000 tons were caught. In 1969, catches fell and a decline of 95% in the herring stocks was calculated. This conclusion was not consistent with a calculation, derived from catch per effort data, that a 75% decrease had occurred.

To investigate this discrepancy in estimates of stock decline (and for other studies) a combined effort by personnel and equipment from Canadian, Russian, and United States fisheries services provided the opportunity.

The Russian research vessel Alferas had mapped a spawning area by grab sampling and had floated a radar buoy to mark its center. The U.S. research vessel Albatross IV, carrying the Canadian submersible Pisces I, sailed from Woods Hole, Mass. to rendezvous with the Alferas.

Information gathered by Pisces I, using cameras and visual observation, indicated that the herring egg beds are on a flat, gravel-covered plain, which extends for miles in all directions at a depth of 50 m. A system of sand dunes was found that shifted on the gravel plain from year to year leaving clear gravel-covered areas for spawning.

Only a fraction of the gravel substrate had been used for spawning. The eggs formed a translucent, dark gray layer 1- to 2-cm. thick over the substrate (when

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the beds, with the density of grazing Scarus spp. and Acanthurus spp. increasing during the observation period.

The plastic strips composed of polyethylene or olefin plastic showed signs of deterioration. Brittleness and cracking was evident. The textured surface of the olefin plastic tended to hold a reservoir of algae. The smooth surface of the polyethylene did not have the same attraction. The pipe frame required repairs within 6 months of submersion.

[4 figures, 2 tables, 9 references] SW

9.17 BIOLOGICAL EFFECTS OF FATTY ALCOHOLS ON FRESHWATER ANIMALS

Mann, Hans (Inst. Kuesten-Binnenfisch., Bundesforschungsanst. Fisch., Hamburg, Germany)
Chemical Abstracts 77, No. 1, 1486q (July 3, 1972)

9.19 MERCURY VAPOR CONCENTRATION INSIDE BUILDINGS

Foote, Robert S. (Geosensors Inc., 9731 Denton Drive, Dallas, TX 75220)
Science 177, No. 4048, 513-514 (Aug. 11, 1972)

Data are listed on the concentration of elemental gaseous mercury in several homes, offices, and laboratories in the Dallas, Tex., area. The levels in these areas are substantially higher than those found in the ambient natural background. About 3 nanograms of mercury per cubic meter of air was found in San Francisco, Dallas, and Washington, D.C. The levels found in the air of the homes, offices, and laboratories ranged from 5.0 to 5,680 ng./m.3.

[1 table, 4 references] FTP

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The facility was located near a large area of underwater grass upon which wild turtles graze. Boats now harvest the grass for fodder in maintaining the turtles. Part of the activity of the aquaculture project is salvaging thousands of turtle eggs from unprotected beaches for incubation and rearing. Several older females, captured to serve as breeders have been laying their eggs at the facility making it less dependent on wild eggs.

[9 photographs] SW

9.19 CHLORINATION AT POWER PLANTS: IMPACT ON PHYTOPLANKTON PRODUCTIVITY

Brook, Alan J., and Alan L. Baker (Department of Ecology and Behavioral Biology, University of Minnesota, Minneapolis, MN 55455)
Science 176, No. 4042, 1414-1415 (June 30, 1972)

As a bacteriocidal agent, chlorine (in the form of hypochlorite or gaseous chlorine) acts to prevent fouling in cooling systems of power plants and as a reducer of biological oxygen demand at the site of sewage release.

Studies of the effects of passage through a power plant on river plankton were performed. Rates of photosynthesis and respiration were determined using the light-dark bottle incubation technique, and changes in the amount of dissolved oxygen were determined by Winkler titration.

During August and September 1971, river ambient temperatures were between 23° and 25° C. Temperatures of condenser discharges were between 32° and 36° C. Compared to control samples taken upstream, samples taken from discharge water without addition of chlorine showed a 5 to 15% depression of photosynthesis and up to 50% increase in respiration. After addition of chlorine (resulting in a concentration of 2,700 p.p.b.), photosynthesis was depressed to between 50 to 90%, and often there was no measurable respiration rate.

The data indicate that chlorination of cooling water depresses rates of photosynthesis and respiration of phytoplankton more than the heat of the water does. The authors suggest that passing the chlorinated water through cooling towers may drive off the chlorine and restore the rates of photosynthesis and respiration.

[2 figures, 3 references] SW

9.17 (1.22)

freshly laid). At later stages, patches of dead eggs appeared, and the mass of eggs seemed to have lost their stickiness. Newly hatched larval herring, with yolk sacs attached, drifted just above the bottom in a cloud about 50 m. across and 10 to 15 cm. thick.

The amount of freshly laid eggs observed from Pisces I is equivalent to 13-20 kg. of eggs per square meter. This estimate is close to the maximum density found by the grab sampling survey from Alferas, but much higher than the average density found in the spawning area as a whole. The authors concluded that grab sampling underestimates the number of eggs laid, and consequently the size of the adult spawning population.

The uniformity of egg development on the bed suggests that the eggs were laid in a period of 1 to 2 days. Thus, large numbers of spawners must have congregated over small areas in a short time; under these conditions they are vulnerable to sophisticated sonar search techniques. When the spawning concentrations are located, although they may be only a remnant of the original herring stock, commercially valuable catches can be made. The authors concluded that these spawning herring concentrations need protection to allow the stocks to recover.

Regarding the value of a manned submersible or a surface vessel in acquiring information, there are uses to be found for both. Only the wide search from a surface vessel could have located the egg beds; detailed observations of the egg beds could have only been made from a manned submersible.

[2 figures, 4 photographs] SW

9.19 (0.6) STABILITY OF ELEMENTAL PHOSPHORUS IN EDIBLE MUSCLE TISSUE OF COD DURING PROCESSING INCLUDING ICING, FREEZING AND THAWING, FROZEN STORAGE, SALTING, AND COOKING

Dyer, W. J., Doris F. Hiltz, R. G. Ackman, Joyce Hingley, G. L. Fletcher, and R. F. Addison (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 7, 1053-1060 (July 1972)

Cod were exposed in vivo to elemental phosphorus in an aquarium under conditions previously described by W. J. Dyer, D. F. Hiltz, R. G. Ackman, J. Hingley, and G. L. Fletcher [J. Fish. Res. Bd. Canada 27, 1131-1139 (1970)]. These cod were then processed and stored by commercial procedures in order to determine the effect of these procedures on the stability of the elemental phosphorus in the edible flesh of the fish. The observations were made on iced round fish and fillets; frozen, stored, and thawed fillets; pickled fish; kench-salted fish; and cooked fish.

The elemental phosphorus in the white muscle of cod was stable when the fish was processed by regular commercial procedures. After iced storage of the cod, freezing and thawing, frozen storage, or cooking, from 40% to 100% of the elemental phosphorus in the muscle remained. Pickled-cod and kench-salted cod stored for 1½-2 months retained 25% or more of the original amount of elemental phosphorus.

When the initial levels of elemental phosphorus in the muscle of the cod was 500 ng./g., the rate of decrease of the element during iced or frozen storage of the fish was very low; when the levels of elemental phosphorus were higher, the rate of decrease was much more rapid. Apparently the lipid in which the elemental

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9.19 METHANOL CLEANS UP IN SEWAGE

Anonymous
Chemical Week 111, No. 3, 35, 36 (July 19, 1972)

Municipal waste waters contain nitrogen; inorganic nitrogen in the form of ammonia averages 30 p.p.m. More than 60% of biological oxygen demand (BOD) of treated effluent results from oxidation of ammonia to nitrates by environmental plant life. Ammonia is toxic to some fish and corrosive to copper fittings. Nitrogen along with phosphorus and carbon is related to eutrophication of receiving bodies of water.

More than 25 states and several heavily populated bay and river basin areas have established nitrogen-control criteria for the effluent of treatment plants. Removal of nitrogen has become an important requirement in sewage treatment.

In the removal of nitrogen use of methanol has been found to be the most economical; the Environmental Protection Agency has found methanol to be the cheapest and purest organic material available for the purpose.

In conventional sewage treatment, filtration removes solids, chemical flocculation and filtration removes suspended solids, aeration reduces BOD, and in some cases, alum is added to precipitate phosphorus. Normally some nitrogen compounds are converted to nitrates during treatment to reduce BOD.

The new technique using methanol may require supplementary treatment to convert all nitrogen to nitrates. Then the sewage is contacted with an anaerobic sludge (in a closed system excluding air) and required amounts of methanol are injected into the system. The methanol provides a source of carbon for the bacteria which are converting the nitrates into free nitrogen gas and carbon dioxide.

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9.19 SPRAY DISPOSAL OF FOOD WASTE

Butters, J. R. (National College of Food Technology, Weybridge, England)
Food Manufacture 47, No. 5, 29-32 (May 1972)

Food processors are facing growing problems in disposing of their wastes. Any disposal method which is cheap and which avoids the risk of polluting watercourses through oxygen depletion should be of interest to food processors. The method, which takes advantage of biological processes occurring when nontoxic liquid wastes percolate into the ground, is spray disposal.

The disposal of municipal waste liquors onto land has been practiced in Europe for many years. Land filtration was effective provided the soil was porous--sand and gravel gave satisfactory treatment at effluent rates as high as 30,000 gal./acre/day. Less porous soils necessitate reducing the flow or are not suitable for this type of disposal.

Spray disposal of liquid industrial wastes onto land is a new development. Food wastes and domestic sewage are similar; however, food wastes contain larger amounts of organic matter resulting in higher biological oxygen demand (BOD). Therefore, to make effective use of the land filtration method, dilution of food wastes may be necessary.

The land filtration spray method has been adopted by food manufacturers because of lower relative costs of equipment which will be operated seasonally, especially in fruit and vegetable processing. Part of the costs may be recovered by raising crops on the sprayed land.

A requirement in the disposal of food wastes by the spray irrigation method is the availability of an adequate area of land, not too distant from the factory.

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9.19 MICROBIAL UPTAKE OF LEAD

Tornabene, T. G. (Department of Microbiology, Colorado State University, Fort Collins, CO 80521), and H. W. Edwards (Department of Mechanical Engineering, Colorado State University)
Science 176, No. 4041, 1334-1335 (June 23, 1972)

As part of an overall research program to examine the possibility that there is a lead cycle in nature for which animals are the focal point, the authors studied the effects of certain inorganic lead salts on several microorganisms. Earlier work by other researchers indicated that lead causes a marked increase in the resistance of red cells to hypotonic saline solutions, is of questionable toxicity to Azotobacter, and does not affect specific cell functions. Also, it has been reported that lead can affect respiration in cell-free extracts of corn mitochondria; however, the effect of inorganic lead on whole cells might be different if lead must first penetrate the cell membrane. This paper reports on the immobilization of inorganic lead by microbial cells and the fraction of immobilized lead that passes through the cell envelope into the cytoplasm.

Micrococcus luteus and Azotobacter sp. cells were grown in broth in contact with a dialysis membrane containing lead bromide. The M. luteus immobilized 4.9×10^2 mg. of lead per gram of whole cells (dry weight basis), and Azotobacter sp. immobilized 3.1×10^2 mg./g. Apparently, lead bromide, lead iodide, and lead bromochloride in concentrations approaching solubility limits have no detectable effect on overall growth rate of the organisms and viability of the cells. Fractions of the cell wall plus membrane of the M. luteus contained 99.3% of the lead found associated with this organism; the same fractions of the Azotobacter sp. contained

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In experiments at a Lebanon, Ohio, plant, instead of using a sludge tank a down-flow column reactor was used for dinitrification. The column is filled with small media (from sand to 3/4-in. stones) on which bacteria grow. Methanol is added to the column.

Systems using methanol will be located in the following areas: District of Columbia, Waukegan, Ill., Contra Costa County, Calif., and Flint, Mich.; others in Hatfield Township, Pa., and Hobbs N.M. Two areas in Florida will use methanol treatment: Tampa Bay, and Orlando; two in the Midwest, Salt Creek, Ill., and Madison, Ohio; and one in El Lago, Tex. SW

9.19

99.1% of the lead associated with the organism. The remainder of the lead was associated with the cytoplasmic fractions.

The authors concluded that the microbial systems examined are capable of abstracting substantial quantities of inorganic lead. Further, the immobilized lead is mostly associated with the cell membranes, and almost none is found associated with the cytoplasmic fractions. Therefore, immobilization of lead by microbial systems may have significance in terms of transfer of lead through the food chain. [2 tables, 14 references] FTP

9.19 MERCURY CONTENT OF HAIR OF JAPANESE AFTER EMIGRATION TO BURMA OR EAST PAKISTAN

Suzuki, Tsuguyoshi, Junko Matsubara-Khan, and Akira Matsuda (Fac. Med., Univ. Tokyo, Tokyo, Japan)
Chemical Abstracts 77, No. 3, 15211h (July 17, 1972)

In part I of this series [Anal. Biochem. 44, 159 (1971)], the author had compiled the amino-acid analyses of 120 proteins from data published between 1966 and 1971. In this part (II), an additional 148 amino-acid analyses have been added, and the data include information published from 1960 to the present time. FTP
[2 tables, 12 + 97 references]

8.51 A COMPILATION OF AMINO ACID ANALYSES OF PROTEINS. II (0.35)

Kirschenbaum, Donald M. (Department of Biochemistry, College of Medicine, Downstate Medical Center, Brooklyn, NY 11203)
Analytical Biochemistry 49, No. 1, 248-266 (Sept. 1972)

9.19 (0.6)

phosphorus was probably dissolved served to protect the element up to a certain threshold value.

The authors concluded that commercial processing of cod polluted with elemental phosphorus cannot make the products safe for use as human food. [4 figures, 4 tables, 8 references] FTP

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Use of the land depends upon soil drainage characteristics, nature of crop cover, climate-temperature, and rainfall. The area to be used must be increased as the volume of waste increases. The land should be relatively flat and even. Any slopes over 5-6% risk pollution of nearby watercourses, and level land avoids ponding. A geological survey must show absence of cracks and fissures in the underlying strata that could lead to contamination of underground watercourses.

Strong winds can carry fine droplets beyond the sprayed area. A windbreak could prevent a nuisance in the surrounding areas. Spraying into woodland would overcome the problem. The volume of liquor that can be applied to a given area without deleterious effects can be increased by presence of a crop cover. The most suitable crop is reported to be pasture grass.

To avoid blockage of pipelines and spray heads, solid particles should be screened out. The composition of the waste liquors must be acceptable to the cover crop and the soil. Mineral and organic content and pH must not be injurious. Alkaline cleaning agents (sodium) must be diluted to below 100 mg./l. before disposal.

The U.S. Soil Conservation Service recommends rates of application to crop covered soil from 45,000 gal./acre/hr. for coarse sandy soils to 3,400 gal./acre/hr. for clay soils.

The method neither pollutes the environment nor disturbs the ecology. [1 table, 15 references] MS

9.19 CARBONATE AND PHOSPHATE DETERGENT BUILDERS: THEIR IMPACT ON THE ENVIRONMENT

Jungermann, E., and H. C. Silberman (Armour-Dial, Inc., Chicago, IL 60608)
Journal of the American Oil Chemists' Society 49, No. 8, 481-484 (Aug. 1972)

This article is a critical review of the impact of detergent builders on the environment and is based on a review of the literature, material balance calculations, wastewater treatment experiments, and aquatic toxicity studies. The wastewater treatment experiments assessed the influence of alkalinity and carbonates on various sewage treatment processes. Apparently, carbonate detergent builders have no detrimental effect on sewage treatment. The carbonate detergents are no more toxic to fish than are phosphate detergents.
[9 tables, 48 references] FTP

9.19 BIODEGRADATION OF TRISODIUM NITRILOTRIACETATE IN A MODEL AERATED SEWAGE LAGOON

Rudd, J. W. M. (Dept. of Microbiology, University of Manitoba, Winnipeg, Manitoba, Canada), and R. D. Hamilton (Dept. of the Environment, Fisheries Research Board of Canada, Freshwater Institute, Winnipeg)
Journal of the Fisheries Research Board of Canada 29, No. 8, 1203-1208 (Aug. 1972)

The trisodium salt of nitrilotriacetic acid (NTA) is considered an acceptable replacement for phosphate as a builder in detergents. However, NTA does not appear to occur widely in the environment, and questions have arisen concerning its effect upon humans and on the environment. Most of the NTA used in detergents might be expected to be exposed to some type of sewage treatment. Previous work has examined the effect of NTA loading in a number of sewage systems, and the results indicated that the efficiency of degradation of NTA is dependent upon temperature (and other factors). In certain parts of Canada sewage lagoons (aerated or unaerated) are operated at very low ambient temperatures (the mean daily temperature of the "mid-continental" area is below 0° C. for 5 months of the year). Should NTA become widely used in Canada, such sewage treatment systems might be a major source of NTA input to the aquatic ecosystem. In the present study, a model system was designed, constructed, and tested for its ability to reflect the operating characteristics of an actual lagoon, and then the model system was tested for its response to loading with NTA. The model aerated sewage lagoon has been described in Fishery Research Board of Canada Technical Report 294, (1972), 32 pp.

NTA was added to raw feed sewage at an equivalent level of 14 mg. NTA/liter (added as NTA-3Na · H_2O at a rate of 20 mg./liter). The breakdown of incoming

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9.19 MOBILIZATION OF MERCURY FROM SEDIMENTS INTO GUPPIES (POECILIA RETICULATA)

Gillespie, D. C. (Fisheries Research Board of Canada, Freshwater Institute, Winnipeg, Manitoba R3T 2N6, Canada)
Journal of the Fisheries Research Board of Canada 29, No. 7, 1035-1041 (July 1972)

Mercury apparently enters fish through the food chain, by direct absorption through the gills, or both. Earlier work by the author and coworker showed a relatively rapid transfer of mercury from sediments (containing added mercurials) to fish. The present article reports additional work on the mobilization of mercury from sediments into guppies.

Guppies were exposed in aquaria to aerobic and to anaerobic sediments to which various forms of mercury (mercury metal, mercuric chloride, and mercuric sulfide) were added, and to sediments from two sites of industrial pollution. The levels of mercury in the whole body of the fish, as determined by atomic absorption analysis, were used as a measure of the mobilization of mercury by the fish from the sediments. In addition, checks for methyl mercury in the fish were carried out at intervals during the course of the experiments.

Under aerobic conditions little mobilization of mercury occurred in the fish exposed to sediments containing added mercuric chloride or mercuric sulfide; however, mobilization of mercury rose rapidly when the fish were exposed to sediments containing metallic mercury. The proportion of methylmercury in the guppies reached maxima of 30% for fish exposed to metallic mercury, 40% for fish exposed to mercuric chloride, and 45% for fish exposed to mercuric sulfide.

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9.19 BEHAVIORAL THERMOREGULATION BY FISHES: A NEW EXPERIMENTAL APPROACH

Neill, William H. (Honolulu Laboratory, Southwest Fisheries Center, National Marine Fisheries Service, Honolulu, HA 96812), John J. Magnuson, and Gerald G. Chipman (Laboratory of Limnology, University of Wisconsin, Madison, WI 53706)
Science 176, No. 4042, 1443-1445 (June 30, 1972)

Discharges from steam-electric powerplants heat the receiving waters unevenly and cause strong spatial variations in temperature. Where fishes lie in such waters determines the metabolic and ecological effects that occur.

Fishes can exert behavioral control over temperatures they experience by swimming into, or remaining in, areas of acceptable temperatures, or by avoiding unacceptable temperatures. Understanding this behavior is important in predicting the ecological impact of heated effluents.

Experiments on behavioral thermoregulation by fishes were performed. A tank was divided into two compartments with access from one to the other. The compartments had heating and cooling capability, and different temperature conditions were maintained in each.

A fish could control environmental temperature by dividing its time between the compartments as follows: passage of the fish into the right compartment causes the temperature to rise at a rate of 3° to 5° C. per hour. The warming stops only when the fish enters the left compartment; then the right side begins cooling at the rate of 3° to 5° C. per hour. The temperature of the left compartment is kept 2° C. lower than the right; thus, the fish always has available alternative temperatures 2° C. apart. By choosing one temperature over another the fish serves as as its own thermostat.

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9.19 CHEMICAL STABILITY OF DDT AND RELATED COMPOUNDS IN SELECTED ALKALINE ENVIRONMENTS

Smith, Sammie, and James F. Parr (Soil and Water Conservation Research Division, Agricultural Research Service, U.S. Department of Agriculture, P.O. Drawer U, University Station, Baton Rouge, LA 70803)
Journal of Agricultural and Food Chemistry 20, No. 4, 839-841 (July-Aug. 1972)

Earlier work has shown that DDT [1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane] degrades more rapidly under biologically active, anaerobic conditions as compared with well-aerated (aerobic) conditions. However, little information is available on the chemical mechanisms that might contribute to the degradation of DDT in soils. DDT in a strongly alkaline alcohol solution does undergo dehydrochlorination. The question has arisen, then, whether certain fertilizers, alkaline in reaction, would accelerate the decomposition of the DDT present in the soils with the fertilizers. E. E. Fleck and H. L. Haller [Ind. Eng. Chem. 37, 403 (1945)] found that, of the fertilizers tested, only dolomitic limestone showed catalytic activity to dehydrochlorinate DDT. The present article reports on the effect of specific alkaline environments (including anhydrous ammonia) on the chemical stability of DDT and related compounds, and the critical pH values affecting their stability. Glass microbeads (diameter from 53 to 74 μ) were used as the synthetic medium for studying the effect of alkalinity on the stability of DDT and related compounds; Crowley silt loam from the Louisiana rice area was used as the soil medium.

DDT was stable in soil treated with anhydrous ammonia at pH > 10.0 and was stable in sterile buffered, glass microbeads at pH values up to 12.0. The

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9.19 ROOTED AQUATIC PLANTS MAY BE MERCURY LINK TO MAN'S FOOD CHAIN

Anonymous
RHSMHA Health Repts 87, No. 2, 133-134 (1972)
BFMIRA Abstracts 25, No. 8, Abstract No. 2857, 572 (Aug. 1972)

Recent research has shown that water milfoil takes up mercury compounds from polluted sediments. It is suggested that other rooted plants may take up mercury in a similar way and that in areas where polluted sediments are known to exist, considerable quantities of mercury may be removed from the system by harvesting the water plants. L.P. Reprinted

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9.19

Under anaerobic conditions total mobilization of mercury was low, and only mercuric chloride was significantly methylated (40%) in the fish. In nature, 80% or more of the total mercury in fish occurs in the methylated form. In the present study, it appears that in a short term (100 days) forms of mercury other than methylmercury are a significant proportion of the total mercury load in fish.

Mobilization and methylation of mercury in fish were proportionally greater in fish exposed to industrial sediments of low mercury content than in fish exposed to sediments with a higher mercury content. Aerobically, lignosulfonate enrichment of sediments showed no real effects; anaerobically, lignosulfonate stimulated methylation of mercury.

[3 figures, 3 tables, 17 references] FTP

9.19 EFFECTS OF DDT ON CATIONS IN THE HEPATOPANCREAS OF PENAEID SHRIMP

Nimmo, D. R., and Robbin R. Blackman (Environmental Protection Agency, Gulf Breeze Laboratory, Sabine Island, Gulf Breeze, FL 32561)
Transactions of the American Fisheries Society 101, No. 4, 547-549 (July 1972)

In earlier work on the effect of DDT in penaeid shrimp, involving both acute and chronic tests, the senior author and his colleagues found that the shrimp accumulated more DDT in the hepatopancreas than in other organs. In the present study, the authors demonstrate that when shrimp are exposed to DDT, the levels of some cations (sodium and potassium) in the hepatopancreas become lower than that in control shrimp. The authors preferred the explanation (from previous work) for these results: DDT interferes with the adenosine triphosphatases involved in active transport of cations into the hepatopancreas, thus failing to balance the normal efflux.
[1 table, 12 references] FTP

9.19

NaJNTA at 15° C. was 93%; at 5° C., 47%; and at 0.5° C., 22%. The authors concluded that aerated sewage lagoons operating at low ambient temperatures in the Canadian "mid-continental" area would discharge at least 50% of incoming NaJNTA for 6 months of the year.

[3 figures, 2 tables, 18 references] FTP

9.19 LEAD CONTENT OF FISH FROM 49 NEW YORK STATE WATERS
(8.42)

Pakkala, Irene S., Merrie N. White, George E. Burdick, Earl J. Harris, and Donald J. Lisk (New York State Coll. Agric., Cornell Univ., Ithaca, N.Y.)
Chemical Abstracts 77, No. 3, 15184b (July 17, 1972)

9.19

threshold pH for dehydrochlorination of DDT [to DDE, 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene] in the microbeads was 12.5; extensive conversion (> 70%) occurred at pH 13.0. DDE applied to microbeads was relatively stable at pH 13.0 even up to 7 days; however, after extended incubation to 28 days, DDE disappeared gradually to 88% at pH 10.0 and 74% at pH 13.0. Similar results were observed in tests of the effect of pH on the dehydrochlorination of DDD [1,1-dichloro-2,2-bis(p-chlorophenyl)ethane] to DDMU [1-chloro-2,2-bis(p-chlorophenyl)ethylene]. DDD was stable for extended periods at pH 10.0, but it converted rapidly to DDMU at pH 13.0.

It is unlikely that any natural environment would have a pH higher than 10.0 to 10.5, and that any strongly alkaline materials introduced into the environment would tend to undergo neutralization by atmospheric CO_2. However, under environmental conditions, the important considerations would be the initial, artificially induced pH and the time required for neutralization (which might be sufficient to effect chemical changes in the pesticide residues that might be present).

[1 figure, 3 tables, 13 references] FTP

9.19 PESTICIDES AND HEAVY METALS IN THE AQUATIC ENVIRONMENT

Morris, Robert L., Lauren G. Johnson, and D. W. Ebert (State Hyg. Lab., Iowa City, Iowa)
Chemical Abstracts 77, No. 4, 24592k (July 24, 1972)

9.19

Young fishes of six species successfully regulated temperature in this manner. Temperatures between 18° and 40° C. were potentially available in each case. The data indicated the fish-regulated temperatures varied relative to species and were in accord with temperature distribution of the same species in a lake receiving heated effluent. The technique may be adapted for studying simultaneously behavioral regulation of temperature and nonthermal factors such as soluble substances and pollutants.

[2 figures, 5 references] SW

9.19 (9.15) PETROLEUM HYDROCARBONS: UPTAKE AND DISCHARGE BY THE MARINE MUSSEL MYTILUS EDULIS

Lee, Richard F., Richard Sauerheber, and A. A. Benson (Scripps Institution of Oceanography, University of California, La Jolla, CA 92037)
Science 177, No. 4046, 344-346 (July 28, 1972)

In experiments with the common marine mussel M. edulis, uptake and discharge of several petroleum hydrocarbons was observed. The following aromatic and polycyclic aromatic compounds were selected because of their toxic or carcinogenic properties: 3,4-benzopyrene, naphthalene, 1,2,3,4-tetrahydronaphthalene (tetralin), and toluene. Mineral oil and heptadecane were selected as examples of nontoxic paraffinic hydrocarbons. Heptadecane also occurs naturally in many marine organisms.

Various concentrations of these compounds were prepared in sea water. Young mussels (0.30 g. without shell), collected off the pier at the Scripps Institution, were placed in 2-liter beakers containing the solutions. Air was continuously bubbled into the beakers.

Parallel studies were conducted in which the mussels were exposed to the following radioactive hydrocarbons (in sea water): [^{3}H]3,4-benzopyrene, [^{14}C] toluene, [^{14}C]naphthalene, and [^{14}C]heptadecane. Hydrocarbon uptake was determined quantitatively by gas-liquid chromatography, thin-layer chromatography, and spectrophotometry. Activity of radioactive hydrocarbons in tissue extracts was determined by scintillation counter.

The naturally occurring hydrocarbon content is about 1 mg. per mussel; analysis of these hydrocarbons showed a series of straight chains and branched chains

(over)

9.19 MICROBIAL DEGRADATION OF DDT METABOLITES TO CARBON DIOXIDE, WATER, AND CHLORIDE

Focht, D. D. (Department of Soil Science and Agricultural Engineering, University of California, Riverside, Calif.)
Bulletin of Environmental Contamination and Toxicology 7, No. 1, 52-56 (Jan. 1972)

The problem of DDT in the environment is its persistence in soil and water ecosystems. In previous work, degradation of DDT through reactions brought about by the action of A. aerogenes was demonstrated. One of the degradation products was p,p'-dichlorophenylmethane (DDM) which was converted to p-chlorophenylacetic acid; other organisms of the Hydrogenomonas spp. were able to split the benzene rings of the latter. The organisms were unable to dehalogenate the products resulting from the splitting of the benzene rings.

An organism was found which was capable of converting the chlorinated bacterial degradation products to H_2O, CO_2, and HCl. This organism was a fungus obtained from sewage effluent by selective culture with 3-chloro-cis-crotonic acid (3-CCC) as the sole carbon source in mineral salts medium. The resulting growth was streaked onto agar plates and a pure culture was obtained. It was maintained in liquid media and on agar slants containing 3-CCC at a concentration of 1,000 p.p.m. The fungus isolate was identified as a hyaline [transparent] member of the family Moniliaceae, producing fusiform phialogenous [saucer-shaped] conidia [asexually formed spores] in slimy clusters or in long chains.

Suspensions of Hydrogenomonas spp. were inoculated in media containing either DDM or p-chlorophenylacetic acid; the products resulting from the cell metabolism were extracted. The extracts were added to basal salts media, purged with N_2 gas,

(over)

9.2 R AND D RESOURCE ALLOCATION--A QUANTITATIVE AID

Block, Robert G. (Air Force Avionics Laboratory, Wright-Patterson AFB, Dayton, OH 45433)
Research/Development 23, No. 8, 20-24 (Aug. 1972)
Card A

This article describes an evaluation method developed to give quantitative aid to R and D managers faced with limited budgets and proposed programs of widely varying potential payoffs, stages of advancement, and resource requirements. The methodology was developed to aid the Air Force Avionics Laboratory in the allocation of its R and D funds.

The Avionic Laboratory management allocates funds among various projects. These projects are subdivided into task areas, and the task into work units. A work unit is the smallest identifiable level of effort within the laboratory. The end product of the evaluation method was a list of 46 proposed work units which required ranking numerically according to funding priority.

This method of evaluation should not be allowed to interfere with the rapport among supervisors and their manager and between other members of the organization. Participation by all managers is recommended. Furthermore, the evaluation technique must be flexible in relation to the constantly changing environment of the system. The environment influences the balance between research and development. It is the function of management to set guide lines for establishing and maintaining a balance between the two.

As a first step, the work units must be evaluated against the overall goals of the organization. An evaluation of only the relative worth of each unit is inadequate since a ranking based on such a scale is deficient for the following reasons: it is difficult to determine the appropriate funding level; low priority

 (over)

9.2 R AND D RESOURCE ALLOCATION--A QUANTITATIVE AID

Block, Robert G. (Air Force Avionics Laboratory, Wright-Patterson AFB, Dayton, OH 45433)
Research/Development 23, No. 8, 20-24 (Aug. 1972)

Card B

Success Factor (SF). This factor is obtained in the equation
$SF = [f(CL)f(OI)]/f(\$)$
where: f(CL) is a function of confidence level, f(OI) is a function of objective importance, f(\$) is a function of funds projected. Confidence levels are based on a scale of definitions: from "problem can be defined," level 0.2, to "technology adequate, detailed design criteria established," level 1.0.

Industrial Funding Factor (IFF). This factor is indicative of the likelihood that a user division will support the work unit. The scale runs from: definitely, at 1.0 to remote chance, at 0.2.

Percentile Composite Score (PCS) would be computed as follows:

$$PCS = \Sigma^{i}_{i=1} \frac{RP_i}{100} W_i = \Sigma^{i}_{i=1} \frac{n-R_i+1}{n} W_i \qquad (5)$$

where: R_i = rank of work unit's score for the ith factor
RP_i = rank percentile for the ith factor = $[1-(R_i-1)/n] \times 100\%$
W_i = weighting out of 100 assigned to the ith factor in the total evaluation

As the evaluation technique was applied in this case i was set to equal 4 for the four factors OI, EFF, SF, and IFF, and the percentile composite score for final

(over)

9.19

and filter sterilized. Each medium containing metabolic products of DDM or p-chlorophenylacetic acid (except the controls) was inoculated with the fungal isolate grown on slant cultures.

Growth was evident in 5 days. The supernatant liquids of both media were positive to chloride tests; uninoculated controls were negative. The breakdown of DDM and p-chlorophenylacetic acid (DDT metabolites) to CO_2, H_2O, and HCl was clearly established.

Furthermore, fungal growth in the system is totally dependent on degradation products excreted by the bacteria (Hydrogenomonas spp.). In order to maintain the level of degradation of DDM by the fungus and to maintain the growth of the bacteria, an energy source external to the system is needed because no energy can be supplied by the cometabolism of DDM. If too much of an energy source is supplied bacterial growth will overwhelm fungal growth. When conditions are optimal for both organisms degradation of DDM can proceed. Future studies relative to metabolism of persistent molecules such as DDM should consider use of mixed rather than pure cultures; the situation that occurs in nature consists of mixed cultures on a multiplicity of substrates.

[1 figure, 3 tables, 5 references] SW

9.2

ranking is given as:

$$PCS = \frac{(n-R_{OI}+1)W_{OI} + (n-R_{EFF}+1)W_{EFF}}{n} + \frac{(n-R_{SF}+1)W_{SF} + (n-R_{IFF}+1)W_{IFF}}{n} \quad (6)$$

The maximum possible score, according to equation (5) and (6) is 100--the case in which one work unit ranks first in all factors.

The author suggests that if this evaluation technique is to be valuable to managers they must not only understand it but also accept it; otherwise, another technique is recommended.

[4 tables, 8 references] SW

9.19 ASPECTS OF WASTE WATER TREATMENT IN THE FISHING INDUSTRY

Ventz, D. (Wasserwirtschaftsdirektion Kueste-Warnow-Peene, Stralsund, E. Germany)
Chemical Abstracts 77, No. 10, 66027k (Sept. 4, 1972)

9.19 (9.15)

from C_{16} to C_{26}. The major components were pristane, (a branched C_{19}), eicosene (C_{20} with one double bond), and heneicosahexaene (C_{21} with six double bonds).

Between 10 and 15 mg. of mineral oil was taken up by each mussel within 2 days after immersion without any ill effects. Longer exposures did not result in further uptake. No significant alteration of the mineral oil after 6 days' exposure was observed. Mussels exposed to mineral oil for 3 days and then transferred into sea water free of hydrocarbons discharged 90% of the mineral oil.

The pattern of uptake and discharge of [^{14}C]heptadecane was similar to that of mineral oil. Tetralin was highly toxic at 100 p.p.m. and, at lower concentrations, caused inability of the mussel to close its open shell. Only 3 to 10 mg. each of [^{14}C]naphthalene, [^{14}C]toluene, and [^{3}H]3,4-benzopyrene were taken up by the mussels. Toluene, naphthalene, and benzopyrene did not have a lethal effect at the concentrations used.

By autoradiography the authors demonstrated that the radioactive compounds tested were not metabolized by the mussels. All the hydrocarbons tested were rapidly taken up by the gill tissue.

[2 tables, 10 references] SW

9.2

tasks may never by considered; it is difficult to choose between tasks of equivalent priority that use different allocations of resources and are at different stages of development; and there can be no balance between systems requirements and long-range applications.

To achieve proper balance between systems requirements and long-range applications, work units should be separated into two groups--subsystems and technical base. The present environment dictates the funding ratio--75% subsystems and 25% technical base. This method injects flexibility into the system since the ratio can be varied depending on the environment. Once this ratio has been established, funds must not be shifted from one category to another.

Four factors were considered and given weights indicative of the current R and D climate: objective importance, efficiency, success, and industrial funding. The factors can be calculated using the following methods.

Objective Importance Factor (OI). This factor is obtained in the equation:

OI = [TAR] [IF] where: TAR = Technical Areas Rating
IF = Importance Factor

Values of OI are ranked and assigned a rank percentile in the equation:

$$RP_{OI} = (1-\frac{R_{OI}-1}{n}) \times 100\%$$

Where: RP = Rank percentile, n = number of work units evaluated

Efficiency Factor (EFF). This factor is obtained in the equation

EFF = [OI]/f($,my)

Where: [OI] = the objective importance factor
f($,my) = a function of dollars and manyears.

The dollar figure and my refers to the funds projected for the work unit, and the manpower per year to be consumed.

[Continued on Card B]

9.2 TRENDS IN USE AND PROSPECTS FOR THE FUTURE HARVEST OF WORLD FISHERIES RESOURCES

Sprague, Lucian M., and John H. Arnold (International Center for Marine Resource Development, University of Rhode Island, 19 Upper College Road, Kingston, RH 02881)
Journal of the American Oil Chemists' Society 49, No. 8, 345A-350A (Aug. 1972)

The authors believe that the yield of marine fishes could be expanded to about 400 million metric tons by harvesting presently known but underutilized species, by opening new fishing areas (such as in the Indian Ocean and Antarctic areas), and by improved management of the fisheries. They believe, further, that we will have to harvest at a lower trophic level in order to meet the maximum potential because most of the fish in higher trophic levels are being harvested at their maximum sustainable yields. The harvest of smaller fish and the increasing demand for fishmeal in animal feeds will result in an increasing proportion of the fish harvested to be used for production of fishmeal and oil.
[3 figures, 7 tables, 15 references] FTP

9.3 U.S. CALLS FOR PROMPT INTERNATIONAL ACTION TO SETTLE PROBLEMS OF LAW OF THE SEA

Stevenson, John R. (U.S. Reprensentative to the U.N. Committee on the Peaceful Uses of the Seabed and the Ocean Floor Beyond the Limits of National Jurisdiction)
Department of State Bulletin 67, No. 1736, 382-386 (Oct. 2, 1972)

This statement was made by the author in plenary session of the U.S. Committee on the Peaceful Uses of the Seabed and the Ocean Floor Beyond the Limits of National Jurisdiction in Geneva on Aug. 10, 1972. The following material was extracted from the author's statement.

"...in order to achieve agreement [on solutions to law of the sea problems], we are prepared to agree to broad coastal state economic jurisdiction in adjacent waters and seabed areas beyond the territorial sea as part of an overall law-of-the-sea settlement. However, the jurisdiction of the coastal state to manage the resources in these areas must be tempered by international standards which will offer reasonable prospects that the interests of other states and the international community will be protected. It is essential that coastal state jurisdiction over fisheries and over the mineral resources of the continental margins be subject to international standards and compulsory settlement of disputes.

"We can accept virtually complete coastal state resource-management jurisdiction over resources in adjacent seabed areas if this jurisdiction is subject to international treaty limitation in five respects:

1. International treaty standards to prevent unreasonable interference with other uses of the ocean....

9.3 ATTITUDES REGARDING A LAW OF THE SEA CONVENTION TO ESTABLISH AN INTERNATIONAL SEABED REGIME

[Authors and titles listed below]
University of North Carolina School of Law, Sea Grant Publication, iv + 143 pp. (Apr. 1972). Price $2.00.

In the Introduction, Seymour W. Wurfel indicated that the 11 papers in this report were prepared by students of International Law at the School of Law of the University of North Carolina in the fall of 1971. These papers examine various national and special interest attitudes toward a seabed regime as these relate to the proposed Draft Convention on the International Seabed Area submitted to the United Nations in August 1970 by the United States Government. The papers are as follows:

"Introduction," by Seymour W. Wurfel, pp. i-ii.

"Japan's Position on a Seabed Regime Convention and Territorial Waters," by C. David Benbow, pp. 1-18. [4 tables, 34 footnotes]

"Canada and the Proposed International Seabed Convention: A Challenge to International Law," by W. Thomas White, pp. 19-33. [46 footnotes]

"Positions That the Central American States Mexico and Cuba May Take Concerning the International Seabed Conference," by Jan H. Samet, pp. 34-53. [3 appendices, 15 footnotes]

"The Legal Regime of Brazilian Territorial Waters," by Robert L. Fuerst, pp. 54-69. [40 footnotes]

"The Probable National Positions of Great Britain and Ireland on the Establishment of an International Seabed Regime," by Keith Douglas Lembo, pp. 70-79. [12 footnotes]

9.4 RESEARCH AND THE FISHERIES SERVICE'S SECOND 100 YEARS

Roedel, Philip M. (National Marine Fisheries Service, Washington, DC 20235)
Fishery Bulletin 70, No. 3, 537-539 (July 1972)

In Century I, fisheries science moved from ichthyology into fisheries biology, added other biological disciplines such as physiology and genetics, accepted mathematics and statistics as integral to success, incorporated physical oceanography, engineering, and physics into the fold, touched on meteorology, became deeply involved with biochemistry and food science, and opened the door to economists and lawyers. The future will hold a greater role for the social sciences and the legal profession, but it will remain the fisheries scientist (whatever he may be--some mix of biologist, ecologist, oceanographer, and mathematician) who will provide the requisite scientific data with which other disciplines can interact to provide the final synthesis upon which the administrator can base his decision.

Research in the Fisheries Service at present falls into three major categories: (i) biological, ecological, and oceanographic research of the sort traditionally conducted by fisheries biologists, including fisheries oceanography, population dynamics, inshore ecology, studies of contaminants and disease, aquaculture, a smattering of gear technology and instrumentation, and so on; (ii) fishery technology and marketing research; and (iii) economic research, this of necessity growing to encompass matters of a social, institutional, or legal nature.

All of this is being carried on so that we may fulfill our mission as we see it: to promote the wise use of living marine resources for their aesthetic, economic, and recreational value to the American people. Our basic objectives within

9.3

"Fishing Treaties and Practices: Position of Iceland on a Seabed Regime Convention," by R. Michael Pipkin, pp. 80-86. [12 footnotes]
"The Soviet Position on a Seabed Regime," by Lawrence U. L. Chandler, pp. 87-96. [28 footnotes]
"China and the Seabed Regime," by James Morrow, pp. 97-105. [18 footnotes]
"Special Problems of Landlocked Countries Relating to the Exploration and Exploitation of the Seabed Beyond the Limits of National Jurisdiction," by Dillon Smith Freeman, pp. 106-115. [19 footnotes]
"Interests of National Security in Formulating an International Seabed Regime," by William A. Christian, pp. 116-129. [18 footnotes]
"Attitudes of Petroleum, Anti-Pollution and Ecology Interest Groups Toward a Seabed Regime Convention," by Robert M. Pitts, pp. 130-143. [26 footnotes]
FTP

9.3 INDIAN FISHING RIGHTS

Phillips, Richard G., Jr.
Williamette Law Journal 8, No. 2, 248-260 (June 1972)

The author proposes that the correct posture in dealing with Indian fishing rights is twofold: (1) determination of the quantum of rights secured the Indians by treaties and (2) determination that the state's overall management of the fish resources recognizes and preserves the treaty rights. [62 footnotes] FTP

9.2 INFLUENCE OF WORLD FAT AND OIL CONSUMPTION ON PROTEIN SUPPLY
(4.80)(6.54)

Senti, F. R. (Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C.)
Journal of the American Oil Chemists' Society 49, No. 8, 337A-342A (Aug. 1972)

Increasingly, oils are produced as a coproduct, if not a byproduct, of protein production from oilseeds and meat. This trend exists in developed countries regardless of whether the protein is used for animal feed or human food purposes. Although the advent of manufactured textured-protein products favors greater use of protein in food products, this outlet appears unlikely to increase the demand for protein concentrates as much as the world demand for animal and protein products. Demand for natural protein and meat analogs will increase (because of increased population and improvement in economic levels). Protein demand will decrease to the extent that meat analogs replace natural products because the analog products have a much greater protein conversion efficiency than do animal or poultry products. The author postulates that should meat analogs replace natural products to the extent that margarine and vegetable shortenings have replaced butter and lard, U.S. requirements for oilseed protein and feed grains would be substantially reduced. Further, vegetable oil demand would increase to take the place of byproduct animal fats no longer produced. The extent to which such a displacement may occur will depend upon the extent to which the textured-products industry is successful in simulating natural products and in marketing them at lower cost.
[8 figures, 6 tables, 16 references] FTP

9.4

the framework of that mission are to understand and protect living marine resources and the environmental quality essential for their existence, and to devise rational schemes for resource allocation and development. Reprinted in part

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9.2 MANUAL ON FISHERMEN'S COOPERATIVES
(9.4)

Anonymous
FAO Fisheries Studies, No. 13, Food and Agriculture Organization of the United Nations, Rome, Italy (1971), 124 pp. Price $3.00 or £1.20.

This manual is a handbook for managers of fishermen's cooperatives. It examines the management methods of marketing and supply cooperatives, points out problems that commonly arise, and suggests ways of avoiding or resolving the problems. The appendices are four selected case studies of fishing cooperatives in widely separated parts of the world [Canada, China (Taiwan), India, and British Honduras]. The selected bibliography contains 107 references.
[FAO publications are available from headquarters of FAO in Rome or from the sales agents and booksellers for FAO publications located in various countries. The sales agent in the United States is: UNIPUB, Inc., 650 First Ave., P.O. Box 433, New York, NY 10016.] FTP

9.3

2. International treaty standards to protect the ocean from pollution....
3. International treaty standards to protect the integrity of investment....
4. Sharing of revenues for international community purposes....
5. Compulsory settlement of disputes....

"With respect to fisheries, our basic interest is to assure rational use and conservation of all fish stocks. To achieve this, we believe coastal states should have substantial jurisdiction over all fisheries, including anadromous species, except where the migratory habits of certain fish stocks dictate another system; for example, the highly migratory tuna should be managed pursuant to multilateral arrangements. In coastal areas, jurisdiction should be limited by such international standards as would assure conservation and full utilization of the living resources.
"It is widely understood that the United States shares the interests of many other coastal states. However, the fact that over 80 percent of our fisheries are off our own coast does not mean that we are prepared to abandon the remaining 20 percent, the distant-water segment of our industry. There are reasonable ways to accommodate the interests of both coastal and distant-water fishing states and to assure the kind of special cooperation between states in a region that many delegations have urged. We believe that a solution of the fisheries problem should take into account the migratory habits of fish and the manner in which they are fished. Thus we can support broad coastal state jurisdiction over coastal and anadromous fisheries beyond the territorial sea subject to international standards designed to insure conservation, maximum utilization, and equitable allocations of fisheries, with compulsory dispute settlement, but with international regulation of highly migratory species such as tuna." FTP

0.115 (0.5) STOMACHING: A NEW CONCEPT IN BACTERIOLOGICAL SAMPLE PREPARATION

Sharpe, A. N., and A. K. Jackson (Unilever Research Laboratory Colworth/Welwyn, Colworth House, Sharnbrook, Bedford, England)
Applied Microbiology 24, No. 2, 175-178 (Aug. 1972)

A mixing device is described that is particularly suitable for preparing suspensions from foods, fabrics, swabs, and other fairly soft materials for bacterial analyses. The sample and diluent are placed in a sterile plastic bag, and the filled bag is placed in the mixing machine. Moving paddles inside the machine vigorously pound the bag; the resulting compression and shearing forces effectively remove even deep-seated bacteria. After samples are taken for analyses, the bag and contents may be appropriately discarded. The apparatus is the subject of a patent application (British Patent Application No. 41395/71). The equipment was tested on the following products and has worked well: beef cuts, chicken, comminuted meats, processed beef, pastry, fruits, fresh vegetables, dried vegetables, fish, cream, fabrics, and swabs.
[2 figures, 1 table, 9 references] FTP

2.00 (8.8) VOLATILE COMPOUNDS PRODUCED IN GROUND MUSCLE TISSUE OF CANARY ROCKFISH (SEBASTES PINNIGER) STORED ON ICE

Miller, A., III, R. A. Scanlan, J. S. Lee, and L. M. Libbey (Dept. of Food Science and Technology, Oregon State University, Corvallis, OR 97331)
Journal of the Fisheries Research Board of Canada 29, No. 8, 1125-1129 (Aug. 1972)

The objective of this study was to identify the volatile compounds associated with the autolytic and progressive microbial degradation of the raw rockfish S. pinniger stored at 0° C. The compounds were identified by combined gas-liquid chromatography and mass spectrometry. The compounds positively identified were dimethyl sulfide, n-propyl alcohol, acetaldehyde, propionaldchyde, acetone, ethyl alcohol, 2-pentanone, 3-pentanone, diacetyl, hexanal, 1-pentene-3-ol, 3-methyl-1-butanol, acetoin, trimethylamine, and dimethylamine. The compounds tentatively identified were propenal, octenal or octadienal, butyraldehyde, 3-methyl butanal, 2-butanone, and methyl vinyl ketone.
[2 figures, 1 table, 21 references] FTP

0.8 VACUUM TESTER FOR PACKAGES WITH FLEXIBLE COVERS

Pfeifer, Charles F. (39 Parade Hill Lane, New Canaan, CT 06840) (pat.)
U.S. Patent 3,667,281
Modern Packaging 45, No. 9, 110 (Sept. 1972)

This vacuum tester is nondestructive and is used for testing of vacuum packages, particularly those used in the packaging of meat and heat-and-serve products wherein one of the packaging members is flexible. FTP

9.11 THE OCEANS: GROWTH AND OXYGEN ISOTOPE EVOLUTION

Chase, C. G. (Department of Geology and Geophysics, University of Minnesota, Minneapolis, NM 55455), and Eugene C. Perry, Jr.
Science 177, No. 4053, 992-994 (Sept. 15, 1972)

In order to model the oxygen isotope evolution of the oceans, the effect of the following four major processes on oceanic oxygen 18 were considered: (1) outgassing of mantle water to the oceans concurrent with volcanic and magmatic activity; (2) withdrawal of ocean water locked into the oceanic crust during sea floor spreading; (3) weathering of primary igneous rocks to form sediments; and (4) metamorphism of igneous and sedimentary rocks.

Calculations based on these processes indicated that the evolution of the oxygen 18/oxygen 16 ratio of the oceans is unlikely to have remained constant with time.

Relative constancy of oceanic volume was also suggested in terms of isotopic evolution; therefore, early formation of the oceans is more likely than linear growth. [2 figures, 12 references] SW

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